THE AMERICAN GAS LIGHT JOURNAL

PUBLISHED WEEKLY, AT No. 42 PINE STREET.

VOLUME CI., No. 11.
Whole No. 2,049.

NEW YORK, MONDAY, SEPTEMBER 14, 1914.

Subscription, $3 Per Year.
$4 Canada, $5 Foreign.

INDEX TO CONTENTS, PAGE 161 . . . . . ADVERTISERS' INDEX, PAGE 18

LIBRARY OF CONGRESS
SEP 14 1914
SMITHSONIAN DEPOSIT

Riter-Conley Manufacturing Company

STEEL CONSTRUCTION

Pittsburgh

THE UNITED GAS IMPROVEMENT COMPANY,

PHILADELPHIA.

—•—

BUILDERS OF

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

—•—

ACCURATE MEASUREMENT

OF

AIR AND STEAM SUPPLY

(PATENTED),

AFFORDING { PERFECT CONTROL OF GENERATOR FIRE CONDITIONS.

PRODUCING { UNIFORM RESULTS. HIGHEST EFFICIENCIES.

THE AMERICAN
GAS LIGHT JOURNAL
INC.

VOL. CI., No. 11. NEW YORK, SEPTEMBER 14, 1914. WHOLE No. 2,049.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

*Surface Combustion, by Prof. W. A. Bone—Part III 161
Would Michigan Gas Plants Benefit from the Services of an Efficiency Engineer? by Mr. R. Shacklette 164
The Increased Cost of Gas, by Mr. John T. Young. 165
A Coke Campaign that Increased Sales Seventy-five Per Cent., by Mr. Richard C. Fowler 166
The Bureau of Standards and Gas Inspection, by C. W. Hinman.. 167
OFFICIAL NOTICES—
Pacific Coast Gas Association, Twenty-Second Annual Convention..... 168
Eighth Annual Convention, Illuminating Engineering Society... 168
EDITORIALS—
Briefly Told 169
Preliminary Notice, Annual Meeting, Empire State Gas and Electric Association—Reviving an Old Form of Graft—Standard Methods of Gas Testing—Personal Responsibility for Fires—Could Export Cement at Once.
*Extinguishing Fires in Volatile Liquids 172
Graphite Imports Cut Off 172
Private vs. Municipal Ownership of Utilities..... 172
The Gas Man as Soldier..... 173
NEW METHODS AND APPLIANCES..... 173
*The Right Way to Hold a Pipe Wrench—Small Coke as a Substitute for Sawdust—A Million and a Half Automobiles.
Recent Patent Issues..... 174
ITEMS OF INTEREST FROM VARIOUS LOCALITIES 174
Hutchinson, Kas., Extensions—Western United Gas and Electric Picnic—Fish—Iowa-Nebraska Company Sold—Mr. Montgomery Resigns—Cambridge Lighting Contract—Boston Output—Dowagiac, Mich., Plant Sold—Freeport, N. Y., Complains—North Platte Construction—Kalamazoo, Mich., Situation—Mr. Gifford Home—El Paso, Tex., Increases—Another Texas City—Cincinnati Valuation—Personal—Dains Quality—Mr. Doty's Success—Resort News—And Other Items.
UTILITIES COMMISSION NEWS 176
Not Guaranteed Return—How Money was Spent—Value of Indiana Plants—Must Supply Everyone—Evanston, Ills., Complaint—Missouri Rules.
Financial Notes..... 176
Public Lighting Table for September, 1914..(Advertising Section) 10
Meeting Times of the Various Gas Associations " 23

Surface Combustion.

[From the Third Howard Lecture by PROF. W. A. BONE, delivered before the Royal Society of Arts, London.]

Surface Combustion Applied to Steam Raising.—For many years past there has been strong competitton between the internal-combustion engine plus gas producer, and the steam turbine plus boiler; and at one time it seemed that the first named combination would establish a marked superiority over its older rival. Mr. E. K. Scott, dealing with the relative merits of the systems, as prime movers for large power stations, has expressed the opinion that, "although the theoretical heat efficiency of the ordinary steam turbine and boiler is slightly lower than the internal gas engine and gas producer, for large powers the steam turbine is at present in an unassailable position," and he stated that Mr. Ferranti had designed a 5,000 horse power steam turbine which, "working with steam at very high temperature, gives a shaft horse-power for less than 6 pounds of steam, the thermal efficiency being over 24 per cent." Assuming this to be so, it would appear that from the standpoint of size of unit, space occupied, capital cost, reliability, and flexibility, the advantage is at present on the side of the steam turbine; and being so, the question of boiler efficiancy and flexibility is of prime importance. While much has been done within the last 24 years to improve the mechanism whereby the energy of steam is transformed into mechanical power, surprisingly little has been done in the direction of increasing either the thermal efficiency or the rate of heat transmission in boilers. Thus in stationary boilers the engineer has been content with an efficiency of 70 to 75 per cent., with an hourly evaporation of 5 to 8 pounds per square foot of heating surface. When it is realized that this rate of evaporation represents a heat transmission of less than 1 per cent. of the maximum conducting capacity of the boiler tubes, assuming an average difference of 1,000° F. between the mean temperature of the products of combustion passing through the tubes and that of the water surrounding them, it is evident what a wide margin there is for improvement.

This unsatisfactory state of things is principally due to the formation, on the underside of the tube, of a feebly conducting and practically stagnant film (about $\frac{1}{16}$ inch thick) of gas at relatively low temperature, which opposes strong resistance to the passage of heat from the burnt gases to the water. Professor Dalby concludes that of the total "temperature head," about 97 per cent. is required to overcome the resistance of the gas film, a further 2 per cent. to overcome the resistance of a similar water film on the other side, leaving only 1 per cent. effective as regards heat transmission across the metal of the tube. While the retarding influence of the gas film upon the heat transmission may be diminished by greatly increasing the velocity of the burnt products through the boiler tubes, it is not generally recognized that, inasmuch as gases are practically transparent to radiant heat, the best way out of the difficulty would be to make the fullest use of "radiation," and rely as little as possible on the sensible heat of burnt products, as the driving force.

The principal defects of the modern coal-fired boiler are: (1) That, owing to the difficulty of ensuring intimate contact between the solid fuel in the furnace and the oxygen passing through it, a large excess of air, never less than 50 and often 100 per cent., is required to avoid incomplete combustion; (2) the general failure to take full advantage of radiation; (3) the comparitively slow velocity of the burnt products through the tubes or flues; and (4) the unnecessarily large losses by radiation and by conduction into the foundation, due to the large external radiating surfaces and the massive brickwork setting.

Ten years ago evidence before the Royal Commission on Coal Supplies showed that about 52 million tons of coal were then being annually converted into steam power in the United Kingdom, and the quantity can hardly be less to-day. Consider the value of the recoverable ammonia and other products which is thus lost to the community; we ought not to rest until the raw coal is subjected to some process for the recovery of such products, whether by gasification or carbonization, before its "fuel value," whether as gas or carbonized residue, is realized under boilers.

There are to-day available three important sources of gaseous fuel which ought to be utilized on an increasing scale for power purposes: (1) blast furnace gas, of which there are large supluses available in all iron-smelting areas; (2) the surplus gas from the manufacture of coke in by-product ovens; and (3) producer gas manufactured under ammonia recovery conditions. The thermal value of the surplus coke-oven gas and blast-furnace gas obtainable per ton of pig-iron produced, is equivalent to the heat of combustion of about one-third of a ton of coal. This, on our present annual output of pig iron, would be equivalent to about 3½ million tons of coal per annum, all of which might be available for power purposes.

With regard to "ammonia recovery" producer gas, the cost of generating gas of net calorific value 145 B.T.Us. per cubic foot from coal at 15s. per ton would probably be about 1d. per 1,000 cubic feet, including all capital charges, so the cost of supplying a million *net* B.T.U. in the form of gas to a boiler would be about 7d. The same number of heat units could be supplied in the form of raw coal for perhaps 1d. less than the above figure, against which, however, must be set the cost of stoking. The question is: Can a gas-fired boiler be constructed which will transmit to the water a much larger proportion of the million heat units supplied to it, than the coal-fired boiler? If this can be answered affirmitavly the proposition of first gasifying the coal under ammonia recovery conditions, becomes commercially feasible. The principal obstacle to immediate developments in this direction is the heavy capital outlay for the ammonia recovery producer plants; if this could be removed, and at the same time the whole plant be made more compact, the gas-firing of boilers would soon become almost universal.

Whereas the substitution of gaseous for solid fuel has in all other industrial operations invariably made for economy, existing types of gas-fired boilers are, as a rule, *less* efficient than the same boilers when coal-fired.

Indeed, it was the contemplation of the inefficiency of blast-furnace gas-fired boilers that first impelled me to transfer my researches upon "surface combustion" from the laboratory to the factory, and I will describe how we have been able to obtain results, with coal gas and coke oven gas, corresponding to the transmission of 92 to 94 per cent. of the *net* calorific value of the gas to the water in the boiler, with an enormous gain in the rate of evaporation as compared with the best contemporary boiler practice.

(a) *The Fundamental Unit.*—Our first experiments in Leeds were made with a single steel tube, 3 feet in length, 3 inches in diameter, packed with fragments of granular refractory material, and fitted at one end with a fire-clay plug, through which was bored a circular hole, ¼ inches in diameter, for the admission of the explosive mixture of gas and air at a speed greater than that of back-firing (Fig. 10). The

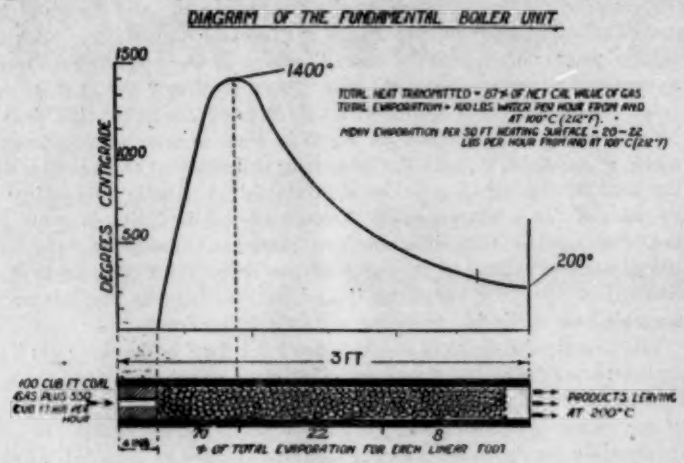


Fig. 10.

tube was fitted into an open trough in which water could be evaporated at atmospheric pressure. Such a tube may be appropriately termed the fundamental unit of our boiler system, because boilers of almost any size may be constructed merely by multiplying the tube, and as each tube is, so to speak, an independent fire or unit, the efficiency of the whole is that of the single tube.

With such a tube it was found possible to burn completely a mixture of 100 cubic feet of coal gas plus 550 cubic feet of air per hour, and to evaporate about 100 pounds of water from and at 100° C. (212° F.) per hour (20 to 22 pounds per square foot of heating surface), the products leaving the further end of the tube at practically 200° C. This meant the transmission to the water of 88 per cent. of the net heat developed by the combustion, and an evaporation per square foot of heating surface nearly twice that of an express locomotive boiler. The combustion of the gas was completed within 4 or 5 inches of the point where it entered the tube, and of the total evaporation 70 per cent. occurred over the first linear foot of the tube, 22 per cent. over the second foot, and only 8 per cent. over the last foot. This points to a very effective "radiation" transmission from the incandescent granular material in the first third of the tube, where the zone of active combustion is located, although it should be remarked that the *loci* of actual contact between the incandescent material and the walls of the tube are so rapidly cooled by the transmission of heat to the water on the other side that they never attain a temperature even approaching red heat. The granular material in the remaining two-thirds of the tube serves to baffle the hot products of combustion, and to make them repeatedly impigne with high velocity against the walls of the tube, thus materially accelerating their cooling, and preventing or minimizing the formation of feebly conducting stationary film of relatively cold gases.

(b) *The Experimental 10-Tube Boiler.*—Having satisfied ourselves of the efficiency of the fundamental unit, we proceeded to construct our first experimental boiler, made up of ten such tubes, fixed horizontally in a cylindrical steel shell, shown diagrammatically in Fig. 11 (section showing three tubes only), whilst Fig. 12 is a back view showing feed water heater.

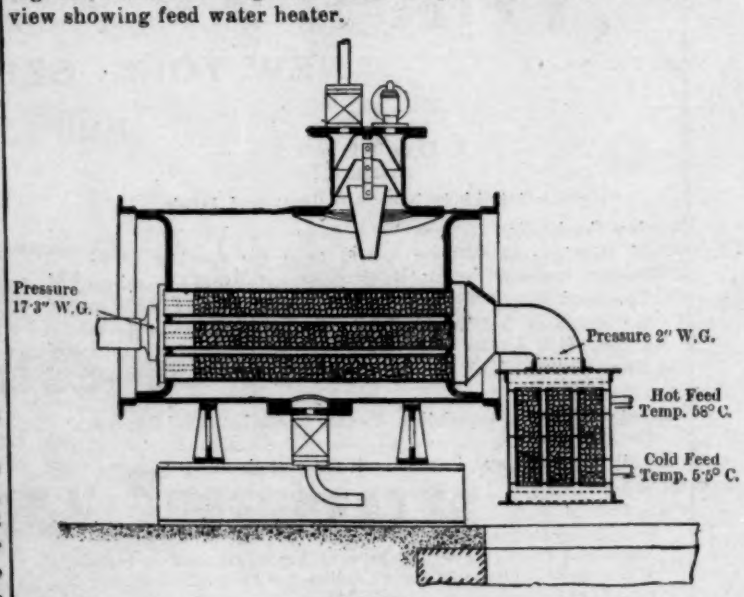


Fig. 11.

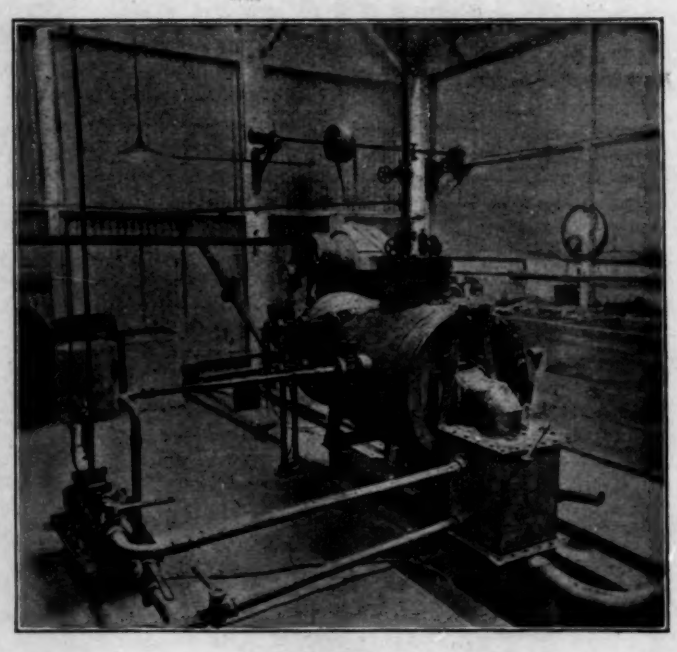


Fig. 12.

The gaseous mixture was forced through the tubes under pressure from a feeding chamber attached to the front plate of the boiler; the products of combustion, after leaving the boiler, passed through a small feed-water heater containing nine tubes, each 1 foot long and 3 inches in diameter, filled with granular material to facilitate the exchange of heat. This combination of boiler and feed water heater proved phenominally successful; in a trial run on December 8th, 1910, with coal gas of 562 B.T.U. net, and evaporating at the rate of 21.6 pounds of water from and at 212° F. per square foot of heating surface per hour, the ratio of the heat utilized to the net heat developed in the tubes were 0.943. But this remarkable result was eclipsed in an independent trial by German engineers in London on January 8th, 1913, when with coal gas of 510 B.T.U. net, and evaporating at the enormously high rate of 33.9 pounds from and at 212° F. per square foot of heating surface, the ratio of the heat utilized to

the net heat developed by combustion was 0.933. The details of these tests are shown below:

	I. Dec. 8, 1910.	II. Jan 8, 1913.
1.—Net cal. value of gas: B.T.U.'s per cubic feet at N. T. P.	562	510
2.—Rate of evaporation: Pounds of water per sq. ft. heating surface per hour (from and at 212° F.)	21.6	33.9
3.—Pressure of gaseous mixture entering the tubes: Inches W. G	17.3	40.9
4.—Pressure of products entering the feed-water heater: Inches W. G	2.0	5.14
5.—Steam gauge pressure: Pounds above atmospheric	100	103
6.—Boiling point of the water: Fahr. degrees	338°	340°
7.—Temperature products leaving boiler: Fahr. degrees	446°	534°
8.—Temperature products leaving feed-water heater: Fahr. degrees	203°	289°
9.—Net heat supplied to the boiler per hour: B.T.U.	559,800	728,333
10.—Net heat transmitted per hour: B.T.U	527,800	680,000
Efficiency ratio	0.943	0 933

It is one of the outstanding merits of the new system that we are able to burn the gas completely with a minimum excess of free oxygen, and during test I. the average proportion of carbon dioxide in the combustion products was as much as 10-6 per cent., whilst the oxygen was as low as 1.6 per cent. Careful examination of the products failed to reveal even the slightest trace of carbon monoxide, hydrogen or methane. Therefore, the remainder of the gas was simply nitrogen. Even with as little as 0.5 per cent. of oxygen in the products of the combustion of the gas in the tubes is perfect, not a trace of combustible gas escaping. The full analyses of continuous samples of the flue products are given below:

Analyses of Flue Products.

	(1)	(2)
CO_2	10.5 per cent.	10.8 per cent.
O_2	1.8 "	1.4 "
CO	nil	nil*
H_2	nil	nil*
CH_4	nil	nil*
N_2	87.7 "	87.8 "

*No unburnt gas.

(c). *The 110-Tube Boiler at the Skinningrove Ironworks.*—Six months' experience with our first unit gave us great confidence, so that when, in 1911, we received an inquiry from the Skinningrove Iron Company for a boiler of ten times the capacity of the experimental unit, to be fired by surplus gas from their new Otto by-product coking plant, we had no hesitation in accepting a commission to install our first large boiler there, under a strict guarantee as to its output and efficiency. This boiler (Fig. 13) consists of a drum 10 feet in diameter and 4 feet from front to back, traversed by 110 3-inch steel tubes packed with fragments of refractory granular material. To the front of the boiler is attached a feeding-chamber which delivers washed coke-oven gas at 60° to 70° F., and under a pressure of 1 inch to 2 inches W.G. to the 110 combustion tubes; this gas, with a regulated proportion of air, is drawn, by suction of a fan, through a short mixing tube into the combustion tubes, where it is burnt without flame in contact with the incandescent granular material. The products of combustion pass outwards into a semi-circular chamber at the back of the boiler and thence to the tubular feed-water heater. The fan is attached just beyond this feed-water heater and sucks out the cooled products (212° F. or under) and discharges them into a short vertical slack.

The plant was started up in November, 1911, for a month's trial-run—day and night continuously—after which it was opened up for an official inspection by the representative of a boiler-insurance company. Everything worked without a hitch; steam was generated at 100 pounds gauge pressure from a feed-water of about 4° of hardness, while the average temperature of the waste gases leaving the feed-water heater was reduced to 80° C., a sure indication of the high thermal efficiency of the plant. At the conclusion of the month's trial the combustion tubes were found to be in good condition and free from scale; indeed, owing to the extremely high rate of evaporation, the scaling troubles experienced with other types of multitubular boilers appear to be completely obviated, the scale being automatically and continuously shed from the tube in thin films (about $\frac{1}{32}$ inch) as fast as formed.

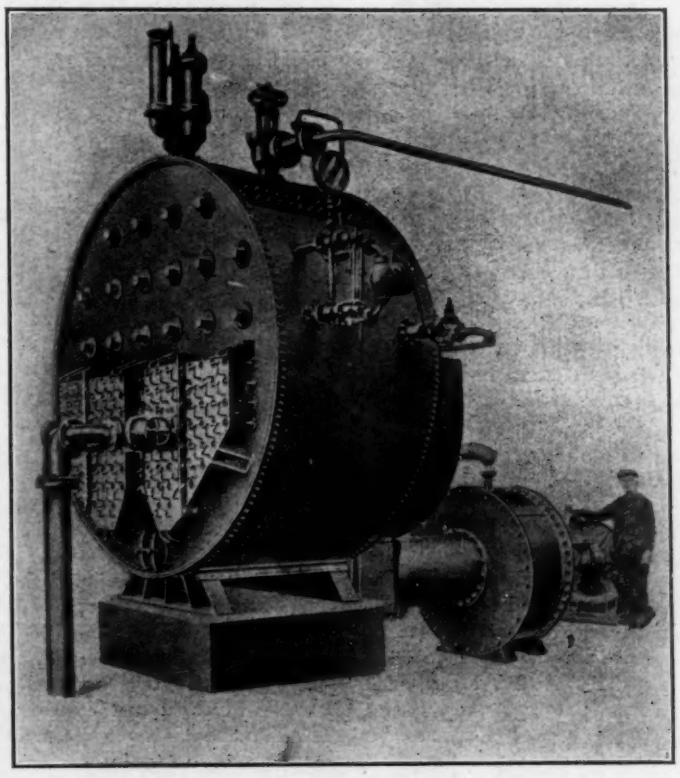


Fig. 13.

After 5 months' actual running, exhaustive trials were made under the superintendence of an eminent American engineer who had crossed the Atlantic to investigate the boiler; he subsequently reported the following results of a 10 hours' steam trial which speak for themselves.

Results of Steam Trial, July 29, 1912.

Duration of test in hours	10
Mean steam pressure, lbs. per sq. in. above atmospheric	97.2
Total gas burnt, cub. ft. at N.T.P.	101,853
Net cal. value of gas, B.T.U.'s per cub. ft. at N.T.P.	510.5*
Total net heat supplied, B.T.U.'s	52,003,996
Temperature of products leaving boiler, Fahr. degrees.	386° (196° C.)
Temperature of products leaving feed-water heater, Fahr. degress.	202° (94.6° C.)
Total water evaporated, lbs. from and at 212° F.	49,824
Evaporation in lbs. per sq. ft. of heating surface per hour	14.1
Per cent. dryness of steam	99.3
Total heat utilized, B.T.U.'s	48,208,399

$$\text{Ratio } \frac{\text{Heat utilized}}{\text{Net heat supplied}} = 0.927\dagger$$

$$\left.\begin{matrix}\text{Power taken by fan} \\ \text{[Suction = 20 in. W.G.]}\end{matrix}\right\} = 6{,}097 \text{ watts} = \text{(say) } 8.2 \text{ H.P.}$$

**An alysis of the gas gave:* $CO_2 = 3.5$; $CO = 6.5$; $C_nH_{2n} = 3.2$; $CH_4 = 28.0$; $H_2 = 48.0$; N_2, etc. = 11.3 per cent.

†Boiler was *not lagged* during the trial, otherwise this figure would have been about 0 04.

The heat balance of the test is as follows, and for purposes of comparison I will give the heat balance for a trial of a marine boiler fired with a good steam coal of net calorific value 13,800 B.T.U.'s per pound (volatile matter = 16.1 per cent.).

		Gas-Fired Surface Combustion Boiler.	Coal Fired Marine Boiler.
Heat utilized		92.7*	75.1
Heat lost	in burnt gases	3.0	18.1
	in unburnt gases	nil	2.8
	by radiation, etc.	4.3	4.0
		100.0	100.0
Rate of evaporation in lbs. per sq. ft. heating surface per hour.		14.1	4.3

*Deducting the steam equivalent of the power consumed in driving the fan on the Skinninggrove boiler, the *over all efficiency* of the plant is *practically* 90 per cent.. To complete the comparison, the coal-fired boiler should be similarly debited with the power (whether human or mechanical) expended in stoking.

The engineer was anxious to find out whether, in view of the intensity of the combustion and the high rate of heat transmission, the boiler tubes after 5 months' continuous running would show any signs of deterioration. Consequently a tube selected by him was cut out and subjected to mechanical tests, similar tests being simultaneously made on a new and unused tube of same dimensions. The results proved conclusively that the 5 month's service had not in any way impaired the mechanical properties of the boiler tubes, thus falsifying the confident predictions of several critics that the tubes would speedily be burnt out.

Perhaps the best testimonial to the success of this initial large installation is the fact that the Skinningrove Iron Company have put down a second unit for their new battery of coke ovens, which is now being started up.

The firm of Krupps have put in a boiler at one of their coking plants in the Ruhr district of Westphalia, from the plans of Skinningrove plant. The boiler has been running successfully since October last, and about 3 weeks ago underwent its official steam trials, carried out by the Bergbaullche Verein. Pending the official publication of the results. I am precluded from giving any details, but an unofficial test on October 30th, showed a total evaporation of 6,750 pounds of water "from and at 212° F." per hour, with an efficiency ratio of 0.925.

(d) *General Considerations about the Boiler.*—I have perhaps said enough already about the boiler and its working to convince you that it at least gives promise of combining structural simplicity, high thermal efficiency, and concentration of power in a unique degree, but there are certain important general considerations which ought to be further discussed. First, from the constructional point of view, what could be simpler or more compact than a cylindrical shell only 4 feet long by 10 feet in diameter, traversed by straight tubes, supported on a casting, and requiring neither elaborate brickwork setting nor expensive chimney flues and stack. Second, it has a further advantage over all other multitubular boilers in that the front plate can never be heated beyond the temperature of the water, however much the firing may be forced, a circumstance which, coupled with the extremely short length of the tubes, implies an absence of strain, and greatly reduces the risk of leaky joints. Third, the high rate of mean evaporation obviates scaling troubles, and the very steep evaporation gradient along each tube causes considerable natural circulation of water in the boiler. In this connection I may remind you that under normal working conditions we obtain a *mean evaporation* of 20 pounds per square foot of heating surface per hour, and can, if need be, force this up to 35 pounds; of this total evaporation 70 per cent. occurs over the first *third* length of the tube, 22 per cent. over the *second* third, and only 8 per cent. over the last third. Fourth, inasmuch as each tube of the boiler is, so to speak, an independent combustion unit, capable of being shut off or lit up without affecting the others, and as it only takes 5 minutes after lighting up a cold tube to attain its maximum steam output, it is obvious that not only is such a boiler highly responsive to rapid variations in the load, but also it works with equal efficiency at both small and big loads; indeed, within very wide limits, its efficiency is practically independent of the load.

The construction of boilers to deal with low-grade producer gas and blast furnace gas must, of course, be varied somewhat, principally in respect of the dimensions of the tubes, but no departure from the fundamental design is necessary. As I pointed out, both the volumes of gaseous mixture which must be fed into the system, and the heat capacities of the products leaving it, in relation to a given heat development in the zone of combustion, are necessarilly considerably greater in the case of producer gas and blast furnace gas than with coke-oven gas. Consequently, if the products be cooled down to the same final temperature in all three cases, they will carry away a number of heat units in proportion to their relative heat capacities. Thus, if with coke-oven gas the heat so carried off is say, 4 per cent. of that developed in the zone of combustion, the corresponding loss with producer gas would be about 5.5 per cent. and with blast furnace gas about 6.0 per cent.

I have endeavored in these lectures to trace the history of an idea from its inception in the laboratory through its experimental stages up to its successful technical application. On the theoretical side there are still obscure points concerning the mechanism of "surface combustion" for future investigation, and it will probably take many years to realize the wide range of industrial possibilities in gas-firing already opened up. The number of applications of "surface combustion" which have been pressed upon our attention from without, is positively embarrassing, and the task of fulfilling all expectations in the near future is indeed formidable. I hope, however, I have succeeded in convincing you that a sound foundation has been laid, upon which may be reared an enduring edifice.

Would Michigan Gas Plants Benefit From the Services of an Efficiency Engineer?

[Prepared by Mr. R. Shacklette, for 23rd Meeting, Michigan Gas Association.]

After reading an article by Forrest Crissy, in the "Saturday Evening Post," some time ago, entitled "Business House-cleaning by Associations," it occurred to me that some such inspection and suggestion service, as he recommended for industrial establishments, might be desirable for the medium or small sized gas plants of Michigan; such service to be rendered through this Association or our State Railroad Commission. When I passed the suggestion to our President, he asked me to write a report on the subject. Now I had no data, nor even definite ideas on which to base a report, for I had simply been comparing my own experiences and observations in gas plants from the Missouri to the Atlantic, with instances cited by Mr. Crissy in connection with certain other industries. There is scarcely a gas plant of any size, or in any location, in which a close observer will not lay eyes on some little wrinkle that he will want to carry away in his memory or note book, and there are also few in which he will not observe some plan or practice that, to the outsider, would seem to be susceptible of improvement. How can we best secure for all the benefit of the experiences of each?

I wrote to the Secretary of the American Gas Institute and inquired as to which of the State Commissions now exercised jurisdiction over gas companies, and found that he had been unable to secure such information up to that time. He did, however, refer me to the list as published in Public Service Regulation, and I then addressed a letter to each of the 46 public utility, or railroad commissions, of the United States, as printed therein. In this letter enquiry was made as to the extent of their jurisdiction, and of their opinion of the value of an inspection service, both from the standpoint of the service company and the communities served. I have had replies from 35 of these commissions, of which 14 have no jurisdiction whatever over gas companies, but of this number Virginia has passed an act giving her's certain jurisdiction, and a number of other states have such legislation under way, or in course of preparation. Of the remaining 21 State commissions, only New York, New Jersey and Wisconsin employ engineers whose duty it is to inspect properties and make recommendations for improvement of service and increase of efficiency. though Maryland and West Virginia have the assuming of such work under consideration, and Missouri expects to begin it as soon as necessary appropriations are secured. The New Jersey reply did not go into detail, but briefly stated that they made provision for it, while New York reports that though the time of their gas engineer is largely taken up with rate and capitalization matters, they do furnish engineering service and advice where it appears to be needed. They also lay particular stress upon the marked assistance which the statistical division has been able to render to various companies through improving the conditions of their accounting, and which would, of course, show up any weak points in operating practice, by comparison with similar or average properties.

To quote further from the New York reply, Mr. C. F. Leonard, Gas Engineer, says:

"An active and thriving state association exists here, which on several occasions has actively co-operated with the Commission in bettering conditions. A recent instance is the work done by a joint committee on calorimetry, consisting of representatives of the commission and of the gas companies, which conducted a State wide investigation, making 6,738 calorimetric and 9,167 photometric tests over a period of 15 months, in laboratories established by 16 companies. A friendly feeling exists. On one occasion members from different sections of the State were detailed to call upon the companies in their neighborhoods; this idea might perhaps be pursued further and applied specifically to helping out the smaller companies. Missionary work among owners, with the idea of showing the possibilities of making gas investments profitable; getting them to send their men to association meetings, and to subscribe for trade papers, inculcating the idea that if money is to be made, some must be spent as well as made; pushing the new business idea; and a general fostering of the feeling that the larger companies are quite ready and

willing to furnish information as to methods, to the smaller ones, will all help. *In taking up the subject of small companies, your Association has touched upon an inherently weak spot in the gas business, and one which should prove fruitful of discussion.*" The italics are my own.

Mr. John H. Roemer, replying for the Wisconsin Railroad Commission, says: "A department of the engineering staff devotes its time to an examination of the physical property and the service of gas companies; it makes suggestions to the companies regarding improvements and methods of economizing in the cost of operation. The statistical and accounting department of this commission furnish the companies with such information as is necessary and required by them regarding statistics and accounting matters."

Mr. R. M. Feustel, now chief engineer of the Public Utilities Commission of Illinois, but formerly assistant chief engineer of the Wisconsin Railroad Commission, has this to say in connection with efficiency inspection in Wisconsin: "The service department was called upon especially during the past two or three years to render very considerable help to the public and privately owned plants in the efficient operation of the same. There was some little criticism that the State was entering into the legitimate field of a consulting engineer and accountant, but the railroad commission felt that if help was actually needed, lee-way should be given to the engineering and accounting departments in rendering this service. The writer believes that a state regulating body which has the money to employ competent help and which naturally gathers a large fund of information that may be of use to the general public, should put its staff and this information, as far as possible, at the service of the public in the solution of all kinds of utility problems."

Workmen's compensation insurance would seem to offer a particularly attractive field in connection with an inspection service, as under our present laws a mutual company could be formed that would, no doubt, permit saving in premiums and increased safety of operation at the same time. The Empire State Gas & Electric Association has been instrumental in the forming of such an insurance company, and I quote from the *Gas Record* of July 22d, with regard to it, as follows: "Every year it is becoming more and more evident to progressive public service men that what is beneficial to the public generally is beneficial to the individual company, even though something else at the moment may seem preferable. Taking this broad view a number of the larger companies, while able to carry their own insurance, decided that a mutual company of this kind, which has been organized, would be for the best interests of the industry in the state, and they have, therefore, not only placed their insurance with this company, but also have been very active in the large amount of preliminary work which has been necessary. The company will promulgate and may modify from time to time standards for construction and for methods of operating, with a view to reducing the number of accidents. It will circulate among its members information with regard to accidents which occur, so that the necessary precautionary measures may be taken to prevent their repetition. It will employ a corps of inspectors to visit the plants of all members, or applicants for membership. The merit-rating system will be employed, which will give added incentive to the members to bring their plants and systems up to standard, and to maintain a high state of efficiency in their accident prevention work."

While reading over numerous sets of rules and laws which were forwarded in answer to my inquiries I was impressed with the fact that the whole tendency in utility legislation seems to be, with few exceptions, entirely restrictive, and with no thought for constructive work, beyond requiring, in some instances, provision for depreciation funds. Now, there are 57 gas plants, more or less, in the State of Michigan, only nine of which serve a population of over 10,000 each. The plant serving over 25,000 will usually have on its staff a pretty competent engineer, and of course some of the smaller plants have the advantage of syndicate ownership, and with it the attendant engineering and accounting service, but the majority of small plants do not have such advantages, nor are they likely to employ a consulting engineer except in matters of extreme importance.

Questions.

Should the Michigan Public Utilities organize a mutual compensation insurance company?

Should the State of Michigan have a Utility Commission modeled along constructtve lines, with efficiency engineers in its service?

Or would it be worth while for this Association to maintain an efficiency bureau along either extended or restricted lines?

The Increased Cost of Gas.

[Prepared by Mr. John T. Young, for 23d Meeting, Michigan Gas Association.]

Carefully prepared statistics show that while the general cost of living has been constantly going up during recent years, gas is the one household necessity the price of which has been decreasing during that period.

In their efforts toward constantly improving the service and reducing the cost to the consumer of the gas they supply to their respective communities, the gas companies of Michigan are now experiencing a very serious handicap by reason of the very marked increase in cost of materials and labor necessary for the manufacture and distribution of gas.

As is well known, the essential materials for gas manufacture—coal in the case of coal gas and oil in the case of water gas—have to be shipped in from a considerable distance and are subject to price changes entirely beyond the control of gas companies. In the case of coal, instead of being, for example, able to utilize the coals mined in Michigan which are not of the proper structure or composition to be utilized in the manufacture of gas, it is necessary to ship in special coals from the coal fields of Pennsylvania and West Virginia. These coals are not only essential for gas making purposes under present restrictions as to quality, but are also valuable for other uses, and the acreage of these coals has been heavily mined and marketed at a constant increase in price, amounting to an advance of approximately 28 per cent. in the past 15 years. It is true that experiments are being made with coals from other fields and especially from Kentucky, but even if these coals prove to be as satisfactory as the Pennsylvania and West Virginia coals, the price that is being asked for them does not indicate that there will be any relief coming from that direction.

The mine operators attribute the increase to three principal causes, namely, the increased value of the coal lands, the increased cost of all materials going into the mines in the way of supplies, and the increased rate for mining and all labor employed in the process of handling, screening and loading coal on cars for shipment. The value of an acre of coal land in the Youghiogheny district is said to be four times greater than it was twelve years ago; the mining rate has steadily increased during the same period until it has almost doubled and the rate for day labor has increased and the hours per day have been shortened. These are the essential reasons set forth by the mine operators for the increase in the price of coal at the mines. Improvement has been made in the process of mining, but the development along this line has not been sufficient to cheapen the cost of producing the coal. Freight rates for transportation of coal from the mines to the gas work have remained substantially the same for the past 10 years.

Owing to the danger of a serious strike on the part of the miners, which is threatened every two years when the mining scale comes up for adjustment on April 1st, the gas company is compelled to carry a large stock of coal sufficient for 60 to 90 days. This not only ties up a large amount of working capital but also entails additional expense for handling to and from the storage pile.

Gas oil used in the manufacture of carburetted water gas advanced in price during the same period about 50 per cent. until last year when it took an unprecedented and sudden rise or advance at the expiration of all contracts to gas companies, amounting to fully 60 per cent. additional. There has been a recession from the extremely high price of last year during this spring and summer, but the cost is still so great as to make the gas companies look upon the future of carburetted water gas as quite unprofitable in this location. Even if the price of gas oil should be greatly reduced, there is always the possibility that it might again suddenly jump up the same as it did last year when the scarcity of gasoline was given as the principal reason for the increase in price and for the disinclination of the oil companies even to make any long time contracts for gas oil at any price. Therefore, any extension in the facilities for manufacturing gas are now largely, if not entirely, confined to coal gas apparatus.

While the materials used in the process of manufacturing gas have been increasing, the wages to laborers at the plant and in every department contributing to the service to the consumer have also been advancing in keeping with the general wage increase in other industries. In fact, in many places, it has become necessary to pay a bonus or some form of premium to the stokers in order to prevail upon them to be steady and regular in their work, and especially so in the summer time when conditions are extremely trying because of the nature of their work, most of which is performed in the intense heat radiated from the retorts.

The price of all materials and supplies used in and about the works and the distribution department is also higher. In fact the advances can be analyzed and accounted for along much the same lines as the coal operator accounts for the increased cost of producing coal at the mines.

It might be urged that much of this advance is offset by increased receipts from by-products or residuals. Such, however, is not the case to any material extent. The retail price of coke is higher than it was 10 years ago, but, on the other hand, practically all of the increased receipts are offset by the greater expense connected with the preparing, handling, marketing and delivering of coke, and bettering the quality of the coke delivered. In the case of tar, the price now obtained is actually considerably less than it was 15 years ago. The same is true of the price of ammonia. As for retort carbon, a minor by-product, it is now almost impossible to obtain any offers from the people who formerly bought it.

If conditions under which natural gas is distributed, could be made to apply to the distribution of artificial gas it would be possible to make use of coke oven processes and other wholesale methods of manufacture of gas. Artificial gas, however, is not adaptable to transportation over long distances as is possible with H. T. electrical transmission, and it is necessary to manufacture it near the city in which it is consumed. On this account the size of the plant is necessarily limited and operations must be carried on in a relatively small way. Labor saving machinery cannot be successfully employed except in large cities and even in the latter case, human ingenuity has as yet not been able to keep pace with the increase in the price of materials and other necessary labor.

Most gas companies at the present time operate and render service governed by artificial restrictions set by city ordinances or orders of State Commissions. The standards set forth in the ordinances were mostly fixed when the physical properties of the materials used in the manufacture of gas were on a much more favorable basis, for example—at the time these standards were adopted, gas coal was obtained from the choicest seams mined. The calorific or heat unit standard in many cases has been based on results obtainable from this exceptionally high grade coal and which it is now almost impossible to buy at any price. Similarly, the candle-power requirements are based on the use of a certain proportion of gas oil per 1,000 cubic feet of water gas manufactured, determined at a time when the cheap price of gas oil would easily permit of enriching the gas to yield a candle power to conform with the requirements. In some of the States where these artificial restrictions are controlled by a Public Service Commission, exhaustive and fairminded inquiries and investigations have proven that it is an economic benefit for both the consumer and the gas company to eliminate the candle power standard entirely, and to modify the heat unit requirement to an average of 570 or a minimum of 550 B.T.U. It would seem that along this direction lies one hope of relief for the gas companies; because a change in these standards will make it possible to employ different grades of coal, of which there is a more abundant supply.

A Coke Campaign that Increased Sales Seventy-five Per Cent.

[Prepared by Mr. Richard C. Fowler, for 23d Meeting, Michigan Gas Association.]

In the fall of 1913 it became evident that the Detroit City Gas Company would have to develop a market for twice as much Genuine Gas Coke as we had ever sold before in one season. In view of the fact that our coke business had been steadily built up over a considerable period of years, and that in the previous winter we had had a considerable shortage which seriously affected our trade, the prospect was one to call for a very strenuous advertising and sales campaign. Previous experience had taught us that the most satisfactory condition for our coke market was when approximately half of our sales were made through our own office and half through dealers. We therefore began about August 1st, to build up a campaign designed to do two things—increase our dealer co-operation and increase the consumer demand.

Possibly the most notable feature of this campaign was the way in which we increased our co-operation from, and with, the dealers. Mr. N. E. Loomis was made superintendent of our coke department and devoted his entire time to furthering our relations with the dealers. A comprehensive advertising campaign was laid out. This was made up in the form of a portfolio which was shown to the dealer as a prospectus of what we were going to do to develop the demand for Genuine Gas Coke, and he was urged strongly to tie up with the campaign in order to cash in with this demand. The campaign included newspaper layouts, street-car cards, folders and billboards. The proposition that was put up to the dealer was simply this: The gas company would spend approximately $3,500 in September, October and November in large display ads in the newspapers, and would pay half of all the ads of a standard form running simply Genuine Gas Coke $6.25 per ton and the dealer's name. All dealers' ads were to be billed to us direct at our low contract rate to enable the dealer who was paying for only half the space to buy this advertising at a very low rate. We supplied the dealer as usual with free booklets on how to burn gas coke to get the best results, these imprinted with his name and address, and attractively printed in orange and black. We distributed 125,000 of them bearing the imprint "Every Dealer is Our Agent" with our gas bills. A number of Michigan gas companies used about 35,000 copies of this booklet which we imprinted with their names and sold them at cost. In all, about 250,000 of these booklets were printed during the season.

We took a half run of all the street cars in the city and had some very attractive street-car cards prepared to run over our own name. We allowed the dealer to use these same cards over his name instead of ours at one-half of our low contract cost. This enabled him to buy as many or as few cards as he wanted on any line that ran in his territory. A similar proposition held good for billboards. Any dealer could purchase as many boards as he chose in any location, and we put up a 24-sheet (9 x 21 feet) hand-painted poster over his name for one-half of the contract cost to us. In every case this made the dealer's advertising very cheap to him, and let him in on such mediums as street cars and billboards where possibly he could not afford to go alone.

The fact that we got the dealer to pay half the cost of the advertising was in itself an innovation, and it took a good deal of sales effort to put it across; but it proved to be one of the strongest features of our program. As soon as the dealer invests money to advertise a particular fuel he is bound to be a little more interested in seeing that the fuel moves. We made this campaign proposition so attractive that in spite of the fact that all gas coke advertising had been previously absolutely free to the dealers, in this season the dealers paid one-half of all newspaper, billboard and street-car advertising that bore their names. Their entire cost, however, actually amounted to only 10 per cent. of our total advertising campaign on Genuine Gas Coke.

We continued our custom of giving our dealers attractive blue and white enameled signs for their wagons, bearing the words, "Genuine Gas Coke," and the dealer's name. We also supplied Genuine Gas Coke transpariences for the dealers' windows, and painted a great many signs on fences, buildings and windows, wherever the dealer desired to put the words "Genuine Gas Coke," and the space seemed to warrant the expense. A handsome jumbo sized calendar was presented to all dealers and tacked up with their permission in a prominent place in their offices. Seven dealers co-operated in using the newspaper space, 13 used the street cars, and 12 used the bill boards. The copy used on the bill board advertising was practically identical with that used in the street cars. In all our advertising copy we made a feature of the line "Every Dealer is our Agent." This pleased the dealer and showed them that we meant what we said when we told them we were going to create a consumer demand that would bring orders across their counters. As a matter of fact, we increased the dealers' sales hand in hand with our own, and actually turned over to them a large number of orders to ensure prompt delivery.

The campaign started September 14th, with a 108 inch ad, and continued throughout October, November and into December with large copy. After Christmas small 12 inch copy was used practically every day. The dealers' ads, for which we paid one-half, started to run October 1st and continued through November. These "ribbon" ads running as they did across the bottom of the page, and set simply in large type, were very striking and connected up in good shape with our educational copy. A full half-run (over 600 cars) of street car advertising was started October 1st. Some dealers placed a card in every car on certain lines that ran through their territory. These cards were continued throughout October, November, December and January and a special card was used by the gas company for all dealers in February and March. Fifty 24 sheet bill boards were used beginning October 1st and running for October, November and December. In this way any dealer could tie up to our big campaign at a small expense, and with newspaper advertising, street car cards, bill boards and folders he had a very well rounded out individual advertising campaign at a mere fraction of what it would cost him to run it alone.

We had a decided falling off in December sales, largely due to the very mild weather, and in fact our total sales were so checked by an unusually mild winter that it was decided that some drastic move

was necessary in order to get rid of the balance of our coke and to cash in on the money and effort already expended. On January 11th a large ad was published in the two Sunday papers, offering a coupon good for 50 cents on a ton of Genuine Gas Coke. The coupon was only good for one week and only one coupon could be used in the purchase of one ton of coke, and not good on half ton orders. These coupons were good at all dealers, and orders were taken by telephone and the coupons collected by the drivers when the coke was delivered. All coupons sent in by dealers had to bear their signature, and every coupon was keyed by a figure in the lower left hand corner, indicating the name of the newspaper and the date on which it appeared.

Six hundred and seventy-five of these coupons were cashed in with orders for 675 tons of coke from the first ad. The 50-cent coupons were offered in various forms of newspaper ads., and ran practically continuously from January 10th, to March 31st. The dates on which the coupons expired were changed every few days so as to force up sales on usually mild or otherwise poor sales' days. Publishing these coupons in the newspapers resulted in the direct sale of 8,746 tons of coke. At the same time that the coupons were being put in the newspapers we issued special coupons bearing the dealer's name and good only at his office for a limited length of time. These brought in orders for 6,085 tons of coke. A special coupon was used by us as a gas bill sticker and brought in orders for 2,797 tons of coke. The total sales of genuine gas coke from these 50-cent coupons amounted to 17 628 tons.

Following all orders for genuine gas coke whether through our office or through the dealers, letters were sent to the customer enclosing our booklet with instructions on how to use coke and a stamped post card for any complaint. These follow-up letters did us a great deal of good. The post cards were very generally returned, and in almost every case bore some compliment rather than a complaint on our coke or service. These testimonials were used in the body of some very strong ads., and also in the form of a double paged letter to our own employees to show them what the general public actually thought of genuine gas coke.

Our office also prepared special advertising matter in the form of folders, blotters, match box stickers, etc., for certain individual dealers who paid the entire cost of getting up and distributing this special advertising. The Diamond Coal and Coke Company alone spent over $1,200 in furthering the sale of genuine gas coke. This company is a combination of five Detroit dealers and they used Genuine Gas Coke as the leader in establishing their company in its new territory.

Throughout the season we ran good strong displays in our show-window on Genuine Gas Coke which followed up the general appeal used in our advertising copy.

Comparing our sales for several years back shows that in spite of an extremely mild winter and the strongest kind of competition from other fuels, these campaign methods increased our coke sales for the season of 1913–1914 by 75 per cent. over the sales of any previous season. Our advertising cost of this whole campaign only amounted to 18½ cents per ton on the total coke sold.

In conclusion, it may be of benefit to point out some of the lessons we learned from this campaign: We believe the importance of dealer co-operation cannot be over estimated, and the best way to secure this is to create a consumer demand that actually brings orders to the dealer. Some other good reasons which influence him to handle coke in preference to other fuels are: The smaller investment necessary together with the consequent larger turn-over, bigger percentage of profit, and smaller loss on account of bad debts; the fact that he has a home source of supply and can send his wagons direct to our works, if he so desires; and the fact that we are on the ground to take care of all complaints.

Comparatively very little effort on our part practically doubled our sales of Genuine Gas Coke in other cities and towns. We believe that the small towns and farms offer a good market for coke which will be developed in the very near future. The bulkiness of coke, which distributes the weight of the load over a large area, makes it especially good for the farmer who has to use his own wagons to haul his fuel.

It is certainly well worth while to follow up all coke sales with a letter enclosing a booklet of instruction and complaint card. This is bound to increase good-will for the company, and often picks up complaints and settles them satisfactorily that otherwise might go unknown and so lose many a customer.

We found that so far as Genuine Gas Coke was concerned our advertising returns were absolutely dependent upon the weather. With the same copy running throughout the week, the cool days never failed to show a marked increase in sales. This shows that it certainly pays to "hit them hard when they are coming." It is far easier to increase coke sales by advertising in cold weather than it is to create new sales by trying to force coke in mild weather. We found, too, that Sunday and Monday advertising pulled away ahead of any other days in the week. The inference being that Sunday is the only day that many men take stock of their coke-pile; perhaps the only day in the week that they see the coke-pile by daylight.

It pays to keep a record of coke sales by districts. This acts as a stimulant to rival dealers, and gives a good check on advertising and sales efforts. We found that over one-quarter of our Genuine Gas Coke was sold in one particular district, and we were therefore governed in our advertising by using the kind of appeal and the advertising mediums that would best reach the class of people living in this district. This system also shows up the weaker coke districts and suggests special efforts in those districts which seem to have good prospects, but make a poor showing.

Offering a coupon as a sales stimulant has many decided advantages over simply reducing the price. In the first place price-cutting always demoralizes business. It is far better to maintain a fixed price throughout the season. The coupon protects the dealers. They are not pestered with questions as to the possible fluctuations of the price of coal or coke. All coupons taken in by the dealers were turned in at our office and credited to their accounts. No allowances had to be made for the coke the dealers had in stock and which had been purchased at the regular price. The coupon scheme was very well received by the dealers, especially when we began to issue coupons for each individual dealer. Incidentally, this gave us a good line on our own advertising and sales efforts, and on the dealers' sales as well. Such a large number of coupons from a universal product like Genuine Gas Coke offers a very good check on the pulling power of the various newspapers and our gas bill-sticker. Aside from their face value, advertising these coupons in the newspaper cost approximately 35 cents per return, while returns from the coupons issued to the dealer cost us 7 cents apiece, and returns from our gas bill stickers only cost about 3½ cents. In advocating the use of such coupons we would recommend that the gas company have special coupons printed and in their offices in case a customer forgot or did not see the coupon advertised. This makes for good-will and greatly simplifies the bookkeeping during the periods that the coupon is in force. It practically means that, so far as the books are concerned, there is a straight reduction in the price of coke. This, however, if carefully managed, need not take away from the effectiveness of the coupon. A coupon always acts as an invitation and an incentive to buy. "Something for Nothing" always pulls, and the coupon gives form to an intangible "something" that is entirely lost when you simply cut the price.

Lastly, it should be borne in mind that Genuine Gas Coke requires a different handling than any other fuel, and if new coke consumers are to be developed into permanent customers the gas company should continue a strong educational campaign and assist them in every way possible to get the best results from burning coke.

The Bureau of Standards and Gas Inspection.

[By C. W. Hinman.]

Some years ago the Bureau of Standards at Washington assumed the task of investigating the methods employed in the official inspection and testing of illuminating gas and the legal requirements concerning the same, and also proposed to publish a text book of gas testing and inspection. Their circular, No. 32, published in 1912, gave some historical notices of gas inspection and regulation in several states and cities, but they were rather unfortunate in their references to Massachusetts. The following statement on page 76 was misleading:

"Since 1861 this State has had certain laws regulating gas distribution, but only since 1885 has the Board of Gas and Electric Light Commissioners been in charge of the enforcement of such State laws. The present gas laws, and the existing practice of the Board, represent the result of over 25 years' experience, and are thus of great importance."

(*Continued on page* 170.)

THE AMERICAN GAS LIGHT JOURNAL INC.

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

E. P. CALLENDER, President.
A. M. CALLENDER, Vice-President and Treasurer.
CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

Agents—American News Co., 11 Park Place, New York City.
Lemcke & Buechner, Berlin, Germany.
Aug. Siegle, 30 Lime Street, London, England.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico, $3 per year. Canada, $4 per year. All other countries, $5 per year.
Single Copies, 10 Cents.

NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, SEPTEMBER 14, 1914.

[Official Notice.]

Pacific Coast Gas Association, Twenty-Second Annual Convention.

Pacific Coast Gas Association,
Office of the Secretary,
August 22d, 1914.

To the members of the Pacific Coast Gas Association: I take pleasure in advising you of the following arrangement in connection with the 22d Annual Convention of the Association, which will convene at Long Beach, Cal., September 15th, 1914, presided over by Mr. Champ S. Vance, of Los Angeles, Cal.

The address of welcome to the Association will be delivered by Hon. L. N. Whealton, Mayor of the City of Long Beach, and Mr. P. F. Hatch, President of the Long Beach Consolidated Gas Company, will welcome the members on behalf of that company.

Programme.

President's Address, by Champ S. Vance.

1. General Utilization of Gas, by Gas Exhibit Committee.
   - a. Gas Street Lighting, by C. B. Babcock.
   - b. Gas Lighting in the Home, by R. J. Thompson.
   - c. Domestic Use of Gas, by B. S. Pedersen.
   - d. Industrial Uses for Gas, by H. P. Pitts.
   - e. Water Heating by Gas, by H. R. Basford.
2. The Nature and Extent of the Obligations of a Gas Company to Improve its Facilities and Extend its Service, by C. P. Cutten.
3. The Appliance End of the Gas Business, by P. C. Wickersham.
4. Welding in Gas Distribution, by D. E. Keppelmann.
5. Wholesale Distribution and Measurement of Gas, by John D. Hackstaff.
6. Problem of Pressure Reduction and Regulation, by A. W. Cash.
7. "Safety First," by C. A. Luckenbach.
8. Gas versus Electricity for Cooking, by R. C. Powell.
9. Wrinkles, by H. W. Burkhart.
10. Experiences, by John Clements.

It is sincerely hoped by the officers of the Association that the members will avail themselves of the many courtesies which will be extended to us by the Hotel Virginia, in order to show our appreciation of the efforts put forth by the management for our entertainment.

The papers which have been prepared for the meeting surpass all previous efforts and contain the last word on the subjects concerned.

The Gas Exhibit Committee, in addition to the excellent papers which have been prepared by them, have arranged for an up to-the-minute exhibition of appliances, which will be open to the public.

The officers of the Association have left no stone unturned toward making our 22d Convention the usual success, and the appreciation of the members of this fact can be demonstrated in no more fitting way than by their arranging to be in attendance.

Henry Bostwick, Secretary.

[Official Notice.]

Eighth Annual Convention, Illuminating Engineering Society.

Cleveland, O.,
September 21st to 26th, 1914.

All preparations have been completed for the reception of delegates and guests at the coming Convention of the Illuminating Engineering Society, to be held in Cleveland, September 21st to 26th. The Hollenden Hotel has been selected as Headquarters, where reservations may be made direct by delegates and guests or, should they prefer doing so, requests may be made for reservations through the Chairman of the Hotel Committee, Mr. A. G. Summerell, who can be addressed care National Carbon Company, Cleveland, Ohio.

Program of Papers.

Monday, Septemder 21st.

Morning Session, 10:30 to 12:30.

- Opening Meeting for ladies and gentlemen.
- Assembly.
- Address of Welcome.
- Response.
- Presidential Address—C. O. Bond.
- Report of Committee on Progress.
- Report of Committee on Research.

Afternoon Session, 2 to 5.

- Color of Illuminants—L. A. Jones.
- Artificial Daylight; its Production and Use—M. Luckiesh and F. E. Cady.
- Development of Daylight Glass—E. J. Brady.

Tuesday, September 22nd.

Morning Session, 9:30 to 12:30.

- Relation of Light to the Critical Inspection of Documents—A. S. Osborn.
- Planning for Daylight and Sunlight in Buildings—L. B. Marks and J. E. Woodwell.
- Air Shaft Illumination as Studied by Models—C. H. Sharp.

Evening Lecture Session, 8:15 to 10:15.

- Photo Sculpturing and the Use of Light in the Reproduction and Illumination of Sculpture—John Hammond Smith.
- Color Photography—M. C. Rypinski.

Wednesday, September 23rd.

Morning Commercial Session, 9:30 to 12:30.

- The Locomotive Headlight—J. L. Minick.
- Present Practice in the use of Tungston Filament Lamps for the Lighting of Metal Working Plants—A. L. Powell and R. R. Harrington.
- Factory Lighting—O. R. Hogue and A. O. Dicker.

Morning Laboratory Session, 9:30 to 12:30.

- Light Filters for use in Photometry—C. E. K. Mees.
- Experiments with Colored Absorbing Solution for use in Heterochromatic Photometry—H. E. Ives and E. F. Kingsbury.
- Characteristic Equations of Tungsten Filament Lamps and their Application in Heterochromatic Photometry—G. W. Middlekauff and J. F. Skigland.
- A Transmission and Absorption Photometer for Small Areas—P. G. Nutting and L. A. Jones.

Afternoon Commercial Session, 2 to 5.

- Recent Improvements in Incandescent Gas Lighting—R. F. Pierce.
- Characteristics of Gas-Filled Lamps—(. M. C. MacKay.
- The Lighting of Rooms through Translucent Glass Ceilings.

Afternoon Laboratory Session, 2 to 5.

- Mixed Specular and Diffuse Reflection—P. G. Nutting.
- Notes on Integrating Sphere and Arc Lamp Photometry—N. K. Chaney and E. L. Clark.

A New Standard Light Source—L. A. Jones.
Some Tests of Possible Reflecting Power Standards—P. G. Nutting, L. A. Jones and F. A. Elliott.

Thursday, September 24th.
Morning Session, 9:30 to 12:30.
Some Uses of Light in the Treatment of Disease—E. C. Titus.
Some Experiments with the Ferree Test for Eye Fatigue—J. R. Cravath.
Further Experiments on the Efficiency of the Eye under Different Conditions of Lighting—C. E. Ferree and G. Rand.
Afternoon or Evening Session, 7:30 to 8:30.
The Visibility of Radiation—P. G. Nutting.
Some Recent Experiments on Vision in Animals—H. M. Johnson.

PROGRAMME OF ENTERTAINMENTS.

September 21, 1914.

Monday, Afternoon.
Tea and social afternoon for the ladies at Hollenden Hotel.
Monday Evening.
Formal Reception and Ball for the ladies and gentlemen, Hollenden Hotel.

September 22, 1914.

Tuesday Afternoon.
Trip to Women's Clothing Factories for ladies. Lunch at factory.
Tuesday Evening.
Popular Lecture at Chamber of Commerce Building for ladies, gentlemen and their friends.

September 23, 1914.

Wednesday Afternoon.
Luncheon and Bridge at Country Club for ladies.
Wednesday Evening.
Banquet, Hollenden Hotel, for ladies and gentlemen.

September 24, 1914.

Thursday afternoon.
Trip to Nela Park, supper and evening entertainment for ladies and gentlemen.

BRIEFLY TOLD.

PRELIMINARY NOTICE, ANNUAL MEETING, EMPIRE STATE GAS ASSOCIATION.—The annual meeting of the Association will be held at 29 West 39th street, New York, on Friday, October 2nd, beginning at 10 A.M.

The program will include two papers on the subject of the free supply and renewal of incandescent lamps and an informal discussion of this subject. There will also be a paper on promoting the use of gas for industrial purposes and the relation of differential rates for gas service thereto.

As usual luncheon will be served in the Engineers' Club and we expect that Hon. Edward E. McCall, Chairman of the Public Service Commission, First District, and Hon. Seymour Van Santvoord, Chairman of the Public Service Commission, Second District, will be with us at the luncheon and will address the members informally at its conclusion.

Further notice in regard to the details will be sent later. Please reserve the date, October 2nd. Very truly yours, C. H. B. CHAPIN, Secretary.

REVIVING AN OLD FORM OF GRAFT—Commissioner Williams of the Department of Water Supply, Gas and Electricity of New York city, has discovered a new form of patronage which he is passing out to residents of Queens, which consists in compelling gas companies in the Borough to place upon their pay rolls inspectors at $100 a month. These men are supposed to inspect activities of the gas companies, but just what they inspect has not been made definite. Those who have been appointed and who are now collecting $100 a month from the gas companies are:

Thomas Martin, assigned to the Woodhaven Gas Company.
Alvin P. Dunham, assigned to the Woodhaven Gas Company.
George C. Olandt, assigned to the East River Gas Company.
John Weichmann, assigned to the Newtown Gas Company.
William Brengel, assigned to the Richmond Hill Gas Company.
John B. Bennett, assigned to the Jamaica Gas Company.
Eugene P. Burden, assigned to the Queens County Gas Company of the Rockaways.
William J. Barr, assigned to the New York and Queens Gas Company of Flushing.

STANDARD METHODS OF GAS TESTING.—The Bureau of Standards, Washington, D. C., has just issued Circular No. 48, entitled, "Standard Methods of Gas Testing." The Circular discusses in detail gas testing methods which have to do with measurements of heating value, candle power, purity, and pressure of gas and the testing of gas meters. Methods of testing are given, and there is also included some discussion of the interpretation of testing results. It is intended that the Circular shall serve as a standard guide for gas inspection laboratory work by city and State officials, and similar work in works laboratories In most cases the methods proposed have been subjected to very careful experimental investigation at the Bureau of Standards. Those methods not investigated by the Bureau have, in general, been used widely by State officials and gas company men; and the proposals have been subjected to the criticisms of a number of experienced men outside the Bureau. The Committee of the American Gas Institute, appointed for the purpose, also examined the Circular while it was in proof form, and the comments of the Committee have been taken into account in the final revision for this first edition. The Circular has just come from the press and is available for distribution. A considerable number of copies will be sent out by the Bureau and others will be issued without charge on request within the limits of the edition. Companies desiring a number of copies to supply to their laboratory men can secure them at a nominal charge, the price being the actual cost of printing. Application for single copies of the Circular should be made to the Director, Bureau of Standards. Additional copies can be ordered with advanced payment of 35 cents each from the Superintendent of Documents, Government Printing Office, Washington, D. C.

PERSONAL RESPONSIBILITY FOR FIRES.—Mr. J. O. Hammitt, chief of the Fire Prevention Bureau of New York City, favors the enforcement of personal responsibility for damages from fire, and urges that property owners whose carelessness is responsible for fires, should be made to pay at least the cost to the municipality of fighting the fires. Along this line, Mr. Hammitt said, in an address before the municipal officers of New York State: "Still another thing we have attempted in New York is of special interest to other cities. Perhaps you know that in some foreign countries a man on whose premises a fire is started is frequently held responsible for the cost of extinguishing the fire and also for damages to the property of others. I do not know exactly how the laws under which this responsibility is fixed in foreign countries are phrased, but we have in the Greater New York Charter a provision under which we think that if a fire occurs or spreads because of the absence of precautions required by law or by lawful orders of the Fire Commissioner, the owners of the premises or person responsible for the violation is liable for the cost of putting out the fire, and for injuries to firemen sustained in fighting it. No suit had ever been brought under this section of our City Charter till the present Fire Commissioner went into office. We had a disastrous smoke fire in the cellar of a loft building. It could easily have been extinguished by a single company without danger to the firemen if an order of the Bureau of Fire Prevention for the installation of a sprinkler equipment had been complied with. Because of failure to comply with this order, Commissioner Adamson holds that the Greenwood Cemetery Corporation, which owns the building, is responsible for the cost of putting out the fire; and he has brought suit to recover. We expect to bring suit also for the injuries to the firemen. Perhaps if we succeed it will be clearly established that the corporation must indemnify all those who suffered loss in the fire. Once that is established, many people will be more careful."

COULD EXPORT CEMENT AT ONCE.—The United States imports relatively little hydraulic cement, only 84,630 barrels having been imported in 1913, whereas the domestic production in that year was nearly 93,000,000 barrels. There is little or no need to import any cement, for all parts of the country are now well supplied with mills for the manufacture of Portland cement, and the supply of raw materials is practically inexhaustible. A significant feature of the cement industry, however, is the fact that, though only about 80 per cent. of the normal cement-producing capacity of the country is employed at the maximum, there is often an overproduction; yet the exports of hydraulic cement have scarcely exceeded 4,200,000 barrels in any year, this amount being only about 5 per cent. of the total output—not sufficent to take care of the surplus production in a year of great activity. There seems to be excellent reasons for stimulating the export trade in cement as rapidly as possible, for, although the export of a relatively bulky and low priced material like cement does not promise large direct profits to an individual producer, indirectly the creation and maintenance of an export trade should benefit the industry at large through the opportunity afforded of disposing of surplus stocks, and thereby tending to maintain steadier prices.

(*Continued from page* 167.)

And the statement on page 120,

"The Board of Gas and Electric Light Commissioners of Massachusetts was established in 1885, and is thus the oldest of all State gas inspection bodies,"

was incorrect.

Their attention was called to these statements, and in the second edition of No. 32 they made the following correct but brief statement on page 117:

"Massachusetts was the first state to provide for gas inspection. The office of State Inspector of Gas Meters and Illuminating Gas was established in 1861. Gas inspection has continued without interruption since that time. Since 1902 the matter has been under the control of the Board of Gas and Electric Light Commissioners."

The following is a more detailed statement:

Official gas inspection was first started in Massachusetts in 1861, and provided means for testing all meters, and for gas testing upon the request of the local authorities. The first inspector was Prof. Wm. B. Rogers, one of the foremost scientific men of his day in physics, chemistry and geology, founder and president of the Massachusetts Institute of Technology. He organized the meter testing substantially as it is carried out to-day and made occasional tests of gas. His assistant, F. E. Stimpson, a graduate of the Lawrence Scintific School of Harvard, was, in 1865, the next inspector. C. W. Hinman, of the chemical department of the Massachusetts Institute of Technology, was appointed in 1871. He devised several new methods and apparatus for the chemical testing of gas, and in 1880 secured the passage of a law for the systematic inspection of all the gas sold in the State. C. D. Jenkins, also a graduate of the Massachusetts Institute of Technology, succeeded to the inspectorship in 1893, having been assistant inspector since 1882. He continued the work of his predecessor and was perhaps the first man in this country to make reliable calorimetric tests of gas. In 1885, a gas commission was created to supervise and control the commercial side of the gas business, but with no control over gas inspection. Not until 1902 was gas inspection placed under the control of the Commission. The Commission have made no changes in the physical testing of gas or meters or in the chemical testing of gas. They have left the routine of systematic inspection substantially as they found it and have made few im portant changes in the legal standards.

If the Bureau's historical account of Massachusetts' gas inspection is somewhat brief and misleading, their treatment of the Massachusetts methods of the chemical testing of gas is no less so. In their recent publication, No. 34, "Determination of Ammonia in Illuminating Gas." an apparatus and method devised by the writer some forty years ago is repeatedly referred to as the "Lacey." It is difficult to understand why it was so called as the apparatus itself as well as the Lacey is fully described on pages 145 to 153 of the "Practical Testing of Gas and Gas Meters," by C. H. Stone; a book of which the Bureau make no mention while they are profuse in their citation of other chemists. The "Massachusetts method," as it is termed by Stone, was as the Bureau correctly observes (No. 34, page 14) "primarily designed for travelling inspection work," but was not thought sufficiently important to warrant detailed description in a chemical journal. The Lacey is an apparatus and method of English origin, designed for testing crude gas at the works and does not in the least resemble the "Massachusetts" apparatus and method. It is difficult to see the value of the Bureau's No. 34 to gas inspection officials, gas manufacturers or the public. Speaking broadly, the gas of *all* cities of any considerable size is free from ammonia; and in the smaller localities ammonia is very seldom present in harmful quantity. The various States and cities having gas regulations put the legal permissible limits for ammonia at from 2½ to 10 grains per 100 feet of gas. Several that established limits for other impurities make no mention of ammonia. Years ago, before the general use of iron oxide for purification, some gases at times contain as much as 100 grains of ammonia per 100 feet of gas, but these gases, with high ammonia contents, were proved to attack the leather diaphragms of gas meters and also brass fittings. Ten grains of ammonia per 100 feet, or one part of ammonia in 3,000 parts of gas, has never been proved to have any injurious action.

As stated by the Bureau, "The results show that the amount of ammonia in gas can be determined with sufficient accuracy for official or commercial testing with any of the five forms." Besides four forms of apparatus in more or less general use the Bureau designed one of their own which they thought had some advantages over the others.

The Bureau chemists criticised the Massachusetts apparatas unfavorably because the acid in it circulated less freely than in the other forms of apparatus. This very fact has always been considered an advantage by the chemists who have used it in their official inspections; for the liquid in the first bulb changes color before the others and so gives sufficient warning that the acid is nearly neutralized. If the circulation was perfect the color would suddenly change in all parts of the apparatus and a constant watch would have to be kept to detect the change.

"Circular No. 20. Determination of Sulphur in Illuminating Gas," is hardly the sort of a paper we should expect to come from a splendidly equipped laboratory and from chemists who set themselves up as models for others to follow. It stated on page 4 that—

"The apparatus most often used in this country for official or works control determination of total sulphur is that of the Metropolitan Gas Referees."

This statement is probably correct if in the place "often" is substituted "widely." Probably more inspections are made by use of an apparatus designed by the writer and improved by C. D. Jenkins, than are made by the use of the Referee's apparatus. The Hinman-Jenkins apparatus is used in making some 800 official tests each year in the States of Massachusetts and New York, and is also used by quite a number of gas companies. Probably it has been used in making 30,000 tests.

On page 11 the apparatus called "Drehschmidt" is described, but no mention is made of the fact that Evans, in England, described a practical identical apparatus some 20 years before Drehschmidt published his description. The remarks and experiments concerning this apparatus do not harmonize well. On page 24 we read:

"The burner adjustment could be made with difficulty with the Drehschmidt apparatus, and on numerous trials the mixtures of gas and air in the burner chamber exploded or the flame was extinguished by lack of air. The apparatus was finally abandoned as being too inconvenient for general use."

But on page 26 we read—

"For scientific use, where accuracy is of first importance, the Drehschmidt type would have considerable advantage; but for commercial work this increase in accuracy is not necessary."

The Bureau chemists seem to have peculiar ideas as to what constitutes accuracy, for on page 25 we have—

Comparison of the Referees and Drehschmidt Apparatus.

Test.	Referee (sulphur per 100 Cubic Feet).	Drehschmidt.	Ratio Dreh-chmidt to Referees.
1	16.1 grains.	17.2 grains.	107 per cent.
2	16.6 "	16.8 "	101 "
3	15.7 "	15.5 "	99 "
4	15.9 "	13.4 "	84 "
5	15.5 "	12.9 "	83 "

But these tests would seem to show either that the Drehschmidt apparatus is decidedly lacking in accuracy, or that the Referees' apparatus is not accurate; or else the Bureau chemists were seriously lacking in manipulative skill. As the Referees' and two similar pieces of apparatus (Elliott and Hinman-Jenkins) have been the only ones used for practical gas testing for sulphur by English speaking people for the last 40 years, it is not probable that the Referees' apparatus was seriously at fault.

This ex-cathedra statement on page 28—

"However, it would be preferable to have the beads used in the condenser, solid, and not perforated, since the washing of the latter form is necessarily less efficient"—

is directly contradicted by the experiments reported on page 23:

Number of Washings Required to Collect Condensate.

Washings.	—Percentage of Total Sulphur Collected— Hinman-Jenkins.	Referees.
2.....	97.4	96.2
3.....	99.0	98.2
4.....	99.8	99.2
5.....	100.0	100.0

It happened the Hinman-Jenkins and Referees' apparatus had condensers that were plain glass cylinders of the same height and diam-

eter, the only difference being that the Hinman-Jenkins was filled with perforated beads, while the Referees' was filled with solid glass balls. They were washed with the same quantity of water each time. The condenser first in the table was of a different size and shape and was washed differently. The result of two washings showed that all but 2.6 per cent. of the sulphur was removed from the perforated bead condenser, while 3.8 per cent. remained in the solid ball condenser. The third washing showed 1 per cent. remaining in the bead condenser against 1.8 in the ball condenser. The fourth washing showed only 0.2 sulphur remaining in the beads, while 0.8 still remained in the balls. That is, instead of the beads being less efficient than the balls, as stated, they were shown by their own experiments to be much more efficient.

It might be supposed that when using any apparatus the designers' directions would be followed. Yet we find that the Bureau chemists used with the Hinman-Jenkins apparatus five times the amount of ammonia recommended by Jenkins,[1] perhaps not realizing the importance of a proper supply of ammonia to the burner. Other experimenters have found that there can be too much ammonia as well as too little. It has also been found that some of the ammonia in and about the flame is burned, and acids containing nitrogen are formed which, in turn, help convert the sulphur into sulphuric acid. The Bureau chemists seem to regard condensation and absorption in the condenser as all-important, and say, page 32—

"The oxidation from sulphites to sulphates is accomplished * * * by the action of the oxygen in the hot products of combustion on the alkaline solution of sulphite formed in the condenser."

But their experiments with the Elliott apparatus should have shown them the falsity of that view. Thus on page 24 they report experiments showing that when no ammonia was used at the burner and sodium hydroxide introduced at the top of the condenser, only 40 per cent. as much sulphur was found as when ammonia was furnished at the flame.

The "Recommendations" on pages 26 and 32 will be of great value to inexperienced gas inspectors.

In the opinion of the writer warning should have been given inexperienced inspectors that a failure to follow exactly the directions given for the gravimetric determination of sulphur, or some other well worked out scheme, would probably lead to serious error. The gravimetric determination of barium sulphate seems simple and easy, but various text book writers, including H. Rose, Fresenius and Treadwell, have devoted considerable space to pointing out the way to avoid various sources of error.

On page 34 of Circular 20 we find—

"A number of volumertic methods have been recommended for the determination of sulphates, several of which are suitable for use with the liquids obtained from the Referees' and Hinman-Jenkins apparatus. Only one of these, a modification of that recommended by Hollinger, will be described."

More than 40 years ago the writer discovered that chromic acid in the presence of hydrochloric acid sets free iodine from potassium iodide. This fact was made use of in devising a method for the volumetric determination of chromic acid. The method in brief was that the chromic acid with the addition of hydrochloric acid was titrated with stannous chloride; near the end of the reaction a little starch paste and potassium iodide were added, and the titration was continued until the blue color of the iodo-starch disappeared. This chromic acid method was applied to the analysis of soluble sulphates. To the sulphate solution was added an excess of a solution of barium chromate in hydrochloric acid, the solution then neutralized, filtered and in the filtrate the chronic acid, equivalent to the original sulphuric acid, was titrated with stannous chloride as before stated. The methods were described in the American Journal of Science and Arts, 14, 478, 1877. Numerous modifications of the sulphate method have been made and published since that time; one described in Treadwell-Hall Quantitative Analysis, page 661, of the second edition (1910). All these modifications make use of barium chromate, the reaction of chromic acid on potassium iodide and the blue color of iodo-starch. Wildenstein anticipated the writer in the use of barium chromate, and the method used by the Bureau chemists might appropriately be called a modification of the Wildenstein-Hinman method.

My original method has been used by the official gas inspectors of Massachusetts and New York ever since its publication in making approximately 30,000 tests. Besides myself, inspectors C. D. Jenkins, C. H. Stone, L. S. James and L. R. Moore have made critical studies of the method. Each of the five of us graduated from the Massachusetts Institute of Technology in the chemical department and were the men recommended by the Institute to the Governor of the States when he asked for a suitable man for gas inspector. Each of us have used the method continuously for from 10 to 30 years. These men were unanimous in finding that the method was accurate and reliable, and preferable in every way to the gravimetric determination of small quantities of sulphur found in gas. They also found that the solutions used, when properly prepared and stored, were subject to only imperceptible changes in several months. The writer found that the stannous chloride solution deteriorated only 1 per cent. in 8 months. Even if the solutions did deteriorate unequally (equal change in the solution would not effect the accuracy of the result) a restandardization could be made in about 5 minutes. These inspectors also found that the method was many times faster than the gravimetric method; Stone, lc., page 136, saying:

"The saving of time over the gravimetric method used by the Referees is very great, as by the Hinman-Jenkins method from 40 to 50 determinations can be made in a day by one man."

Jenkins published a description of the apparatus and method in "The Journal of the American Chemical Society," Vol. XXVIII., No. 4, April, 1906. He says, page 543:

"A weak sulphuric acid was analyzed by different methods with the following results—

	Grams
The usual gravimetric method gave	0.04772
Titration against sodium carbonate	0.04783
The above volumetric method gave	0.04804

Four sets of apparatus were run in parallel with a common gas supply. The sulphur being determined as above, gave grains per 100 cubic feet of gas: 12.26, 12.29, 12.23, 12.26.

Ten cubic feet of gas were burned in several apparatus' and the sulphur determined in duplicate, gravimetrically and volumetrically, as follows:

	Grams per 100 Cu. Ft.	Grains per 100 Cu. Ft.
Gravimetrically	10.97	10.97
Volumetrically	11.01	11.04

The Bureau chemists did not try or even mention the writer's method in spite of its long and satisfactory use in gas-testing, but instead, experimented with a modification of their own of a method somewhat similar to mine—a modification that probably had not been used at all in actual gas-testing. Tests with their modified method (given on page 45) of a solution similar to the one tested by Jenkins, show:

Bureau Chemists.	*Jenkins.*
1.593	12.26
1.602	12,29
1.597	12.23
1.601	12.26
1.596	.....
1.589	.....
1.574	.....
1.575	.....
A difference of 1¼ per cent. between extremes.	A difference of scant ½ per cent. between extremes.

The Bureau chemists used a comparitively large volume of liquid which apparently was allowed to cool in contact with the air, and if conditions were not kept exactly the same for each determination varying quantities of exygen would be dissolved in the liquid to be titrated. Under the conditions in which the titration was made, each volume of dissolved oxygen oxidized a certain quantity of sodium throsulphate. These facts may serve to explain the somewhat discordant results of their tests. Also if the potassium iodide contained iodate, and the amount added was not accurately weighed, the results obtained would vary.

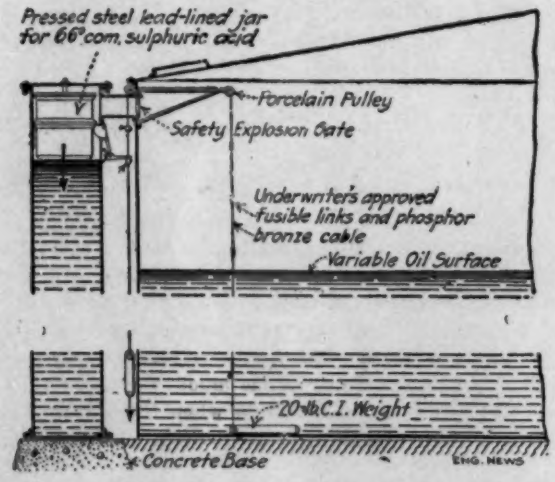
Many experiments were made with the turbidimeter, but the results obtained do not seem to be exact and reliable enough to warrant its use in official work.

ALL the coke made in New York is made in retort ovens from coal mined in Pennsylvania. There are four establishments in the State, with a total of 555 ovens. Although New York lies entirely outside of the coal-producing area, it was the first State in which were built by-product ovens. The first twelve Semet-Solway ovens constructed in the United States were erected in 1893 at Solvay, N. Y.

1. "Journal of the American Chemical Society," Vol. XXVIII., No. 4. April, 1906.

Extinguishing Fires in Volatile Liquids.

An automatic tank-fire extinguishing equipment consisting of standpipes placed around and connected to the tank, as shown in the cut, was recently tested with satisfactory results, at the Bayonne refinery of the Standard Oil Co. The first test was made July 22 in connection with a roofed tank 40 feet in diameter. The extinguishing apparatus consisted of four standpipes 30 inches in diameter, the same height as the tank, placed at intervals of 90°. There was a direct outlet into the tank from the standpipes at the top, about 12 inches wide by 8 inches deep. The standpipes contained about 1 gallon of a solution of sodium carbonate and soap bark per square foot of oil surface. Lead lined sulphuric acid containers were suspended from the top of the standpipes, and connected to a phosphor-bronze cable containing fusible links, controlled by a series of triggers, the cable and fusible links arranged to permit frequent inspection.


Pressed steel lead-lined jar for 66° com. sulphuric acid
Porcelain Pulley
Safety Explosion Gate
Underwriter's approved fusible links and phosphor bronze cable
Variable Oil Surface
20-Ib C.I. Weight
Concrete Base
ENG. NEWS

For the test, water was admitted to the tank to within 3 feet of the top, 3,000 gallons of Mexican crude oil and some naphtha were floated upon the water, and a torch applied. When the fusible links melted, the acid dropped into the chemical solution in the standpipe and the resulting foam overflowed into the tank through the openings. The fire was automatically extinguished in 9 seconds by a 14-inch layer of foam.

On July 24th another test was run, in which the fire was permitted to gain headway. The roof and automatic devices were removed from the tank and the standpipes arranged to operate by hand through a 75-foot cable, so that the acid could be released at will. The water in the tank was lowered 6 feet, as it was thought that the foam, in issuing from the discharge opening into the flame, might be destroyed to a certain extent and that its rapid spreading across the surface of the oil would be impossible. On the water in the tank 3,000 gallons of crude oil and 100 gallons of gasoline were added and ignited. The fire was permitted to burn for five minutes, when one of the standpipes was operated. It made little impression, but the remaining standpipes were released 30 seconds later and the fire was extinguished in one minute.

Graphite Imports Cut Off.

Although the graphite imported into the United States in 1913 was almost twice the domestic production, the cutting-off of the foreign supply should seriously affect only the crucible industry. There is an ample supply of graphite in this country suitable for stove-polish, foundry facings and paint pigments, and large deposits of amorphous graphite in northern Mexico are controlled by American firms and can be depended upon for supplies of graphite for pencils, lubricating material and many other uses. In addition, graphite is being manufactured in electric furnaces at Niagara Falls in amounts far in excess of the domestic production from natural sources, and this graphite is well adapted for most of the uses to which natural graphite is applied.

The graphite from foreign sources is used in the manufacture of crucibles and other refractory products, but as these uses probably consume half the graphite used in this country this supply is a matter of no small importance—especially to the manufacture of crucible steel. The graphite used in crucible making has been brought largely from the British island of Ceylon, although within the last few years some has come from the French island of Madagascar. This graphite is flaky or fibrous and therefore eminently adapted to crucible making, and for this use has never met with serious competition from domestic graphite. The earthy amorphous graphite mined in this country and artificial graphite are not adapted to this use, and, as a rule, the expense of concentrating domestic flake graphite has been prohibitive. Nevertheless, it is to the domestic supplies of flake graphite that this country must look in the event of foreign supplies being entirely cut off. Practically inexhaustible supplies of this material occur in New York, New Jersey, Pennsylvania, North Carolina, Alabama, Texas and other States, and are fully described in the reports of the Geological Survey. The graphite in these deposits occurs as small flakes in rocks composed mainly of quartz, feldspar, and mica, the graphite constituting 5 to 10 per cent. by weight.

Several such deposits are now worked, and many others could be put on a producing basis at little expense. Although the product may not equal the Ceylon graphite in all respects for crucible making, similar graphite has for years been successfully used in Germany. Another American resource is the graphite deposit near Dillont, Mont., this graphite being very similar to that from Ceylon, and should be adaptable for crucible making. Although the deposit does not compare in size with Ceylon, it might render material aid in case of a shortage.

Private vs. Municipal Ownership of Utilities.[1]

In considering the question of municipal as against so-called private control of public service utilities, no better basis is available than is found in a comparison of the conditions existing in the United Kingdom and in the United States. In England, municipal control of public utilities is general and private ownership relatively limited. In the United States the reverse is the case; municipally owned and operated electric services are the exception, the industry being dominated by private enterprise.

It will be generally agreed by impartial critics that the electrical supply of London, considered as a whole, is obsolete and inefficient, both as regards employment of capital and economical generation and distribution of electrical energy. In an area containing a population of approximately 7,250,000, there are seventy-six electric public service stations; thirty-six operated by local municipal authorities and thirty by distributing companies. Eight are operated by railway companies, one by a tramway company, and one by the London County Council, also for street railways. Forty-seven of these stations are within the County of London, and twenty-nine outside. The supply given from these stations varies both in kind and pressure. They are not in a position to co-operate with each other, and each must be operated largely as a separate unit and have its own spare plant and reserve. Direct current is supplied at eighteen different pressures, while alternating current is supplied in the form of single phase, two-phase, and three-phase, with eight different frequencies, and eighteen different pressures. Obviously a cheap supply could not be obtained by any system of linking up such stations, and the only alternative was to put down one more central bulk supply station. Out of a total investment upon all the generating plants of $47,500,000, upward of $19,500,000 has been expended on land and buildings only. For this sum a complete bulk supply installation of a capacity approximately equal to the present output of all the stations could be provided, with generating works, transmission and distribution system, and transformation to the pressure and kind required by the authorized distributers.

Consider now a community where diametrically opposite conditions exist, where municipalization has not checked development, and where the market is served by one comprehensive and efficient organization instead of by a number of small and inefficient stations. Mr. Samuell Insull, in his recent address before the Investment Bankers' Association, estimated that the population served with electrical energy for transportation, light and power by his company The Commonwealth Edison Company, of Chicago, within and outside the city limits, exceeds two and one-half millions of people. The figures show that while over 5,000 customers were served in 1898, in 1912 180,000 were served. Although Mr. Insull estimates that not more than one-third to one-half of the total possible demand is now being supplied, the electrical output of his company increased from 10,000,000 kilowatt hours, in 1900, to 800,000,000 in 1912, which is

1. A. K. Baylor in "The Annalist."

equivalent, according to "The Electrical Times, of London, to about 75 per cent. of the electrical energy produced in the whole of Great Britain. At the same time there has been a steady decrease in cost of production and consequent reductions in price of electrical energy to the customer.

The total mileage of street car lines in the United Kingdom, with its population of 45,000,000, is equal to approximately the mileage of the State of New York or Pennsylvania (not both, but one of these States), with populations of 9,113,000 and 7,665,000, respectively. From the top of any of the high buildings in New York an observer may cast his eye over an area lying almost at his feet (Manhattan, Brooklyn, Westchester, and the New Jersey suburbs) with a population of 6,500,000, that is served by 50 per cent. more unit electric cars than are to be found in the whole of the United Kingdom.

There were, in the United Kingdom, approximately 460 central stations, according to the published list of June, 1912. For the United States the records of the same date show about 5,900.

In England the larger communities only are served, 75 per cent. of the plants being in towns of over 10,000 population. In the United States 85 per cent. of the central staticns serve places of less than 5,000 population.

Municipal ownership is to a large extent private ownership, in the sense that the taxpayers are, in their private capacities, virtually stockholders, but without the advantage of limited liability; while the so-called "private" enterprise is in a large measure public, both in the nature of the service and the wide distribution of securities.

The Gas Man as Soldier.

The Gas World (London) gives this account of the situation in the industry in England:

"The call of the nation to arms has had no more effective answer than from the men engaged in the gas industry, and this is particularly the case in London.

The Gas Light and Coke Company have had something like 700 or 800 men called up. The Company have for years encouraged their men to join the Territorial Force, and their men practically fill the ranks of the 12th (County of London) Batialion, known as "The Rangers," of which the Governor of the Company, Sir Corbet Woodall, is Honorary Colonel.

From among the employees of the South Metropolitan Gas Company some 600 Reservists, Territorials and ambulance men, have joined the colors. The following, from a poster which is displayed at the Company's various stations, etc., shows how faithfully the Company recognize their obligations:

The places of all the above (Army and Navy Reservists, etc.), including accepted volunteers, will be kept open during absence on public service, and such absence will be counted in all respects as continuous service with the company. During the Boer War the wives and children left behind received weekly allowances provided by the company and the employees. Provision was also made for the widows and orphans. The company will do its share in like manner under the present circumstances. A meeting of the Co-Partnership Committee has been summoned to discuss the position.

The Commercial Gas Company have parted with between 20 and 30 of their 13,000 men, and it is expected that a number who are not at present connected with any of the services will volunteer. The company will give half-pay and keep places open for the men.

With regard to some of the other London companies, the Brentford Company are parting with 150 men out of the 1,000 they employ. The Tottenham District Light, Heat and Power Company are contributing 80 or 90 men out of a total of 900. Of the South Suburban Gas Company's 950 men 43 have been called up. The Croydon Gas Company have lost 10 per cent. of their male employees—70 out of 700.

With regard to what the companies will do to help those who depend on the breadwinners who are called away, complete information cannot yet be given, as some of the boards have not yet met to consider the matter. In one or two cases, besides those already mentioned, the matter has been settled. The Brentford Gas Company will pay half wages in the case of all men serving, whether married or single. In the case of the South Suburban Gas Company the employees and the company will contribute to a fund from which 10s. a week will be paid in respect of every wife and 2s. a week in respect of every child. Needless to say that in all cases the places of the men will be kept open for them.

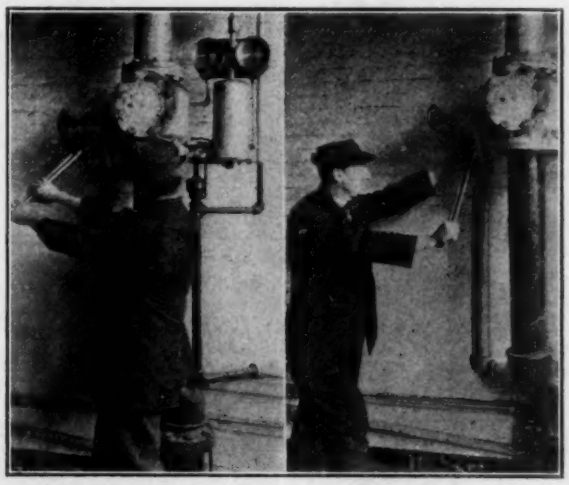
At a meeting of the Manchester City Council it was resolved that all Reservists and Territorials in the service of the Corporation who had been called up should be allowed half pay during the time they were away. At a meeting on the same day of the Salford Town Council a resolution was passed to the effect that the Corporation should provide adequately for the wives and children of the employees called away for service in the war. A special sub committee was appointed to prepare definite proposals for the consideration of the General Purposes Committee.

The General Purposes Committee of the Leeds City Council decided to recommend that all men should be reinstated on their return, and that 5s. a week should be allowed to each single man with dependents, and to the wife of each married man 5s. a week, with 2s. a week for each child under 15 years of age.

To encourage recruiting to the Territorial force the directors of the Plymouth and Stonehouse Gas Company called a meeting of the employees of the company on the 29th ult. The chairman of the company, Sir Joseph Bellamy, addressing the men, said the directors, when the time came, would recognize the young men who had been ready to make a little sacrifice for their country. Wholesome discipline would benefit the men, and in the units they would find the best of comradeship. He also stated that, among young men who wished to join the company, preference would be given to those who had been Boy Scouts or members of a Boys' Brigade.

New Methods and Appliances.

THE RIGHT WAY TO HOLD A PIPE WRENCH.—One who has more confidence in his pushing than his pulling power may regret his failure to develop the latter if he has much occasion to use a pipe wrench and has skinned his knuckles when the wrench slipped or the pipe suddenly responded to the force tending to turn it. The accompanying illustration show the right and wrong way of using



The Safe and Unsafe Way to use a Pipe Wrench.

such a wrench. The man loosening a pipe in the manner shown in Fig. 2 would be likely to bruise his hand severely if the wrench slipped. But with the wrench held as shown in Fig. 1 there is no danger of injuring the knuckles if the wrench fails to hold. The illustrations are from the series used by the Rochester (N. Y.) Railway and Light Company to educate its employees in avoiding accidents.

SMALL COKE AS A SUBSTITUTE FOR SAWDUST.—M. Lebel, before the last meeting of the Société Technique, recommended the use of finely broken coke for mixing with oxide in the purifiers, in place of sawdust. In addition to its drawback of inflammability, sawdust is difficult to combine with the oxide, because of the great difference in the density of the two materials. Further, its color being similar to that of the oxide, control of the proportions by this means is impracticable. As a substitute for sawdust, he uses broken coke, consisting of pieces ranging from 8 to 12 mm. (0.3 to 0.5 inch) in size, and gets results equal to vertical grids at a much lower cost in the first instance and saving in subsequent manual labor. The advanteges of the broken coke are thus stated:

Sawdust.	*Coke.*
Difficult to mix with oxide, and impossible to adjust mixture by color.	Mixes readily with oxide, and the mixture can be judged by the color.
Steady increase in resistance to flow of gas; making it difficult to ascertain complete exhaustion of the material.	Increase of resistance to the gas inappreciable at first, suddenly becoming greater when the material is near exhaustion; thus showing exactly when the oxide requires to be revivified.
Necessity of making one or two revivifications of fresh material before securing regular purification of gas.	Material works regularly from the start.
Material hardens into large masses, requiring the pick when emptying the boxes.	Pieces of coke of the size named prevent the formation of hard masses.

The mixture which appears to be best consists of equal parts by bulk of oxide and coke—that is to say, when using proxide of iron containing a fair proportion of clayey matter and of yellowish shade. With purer oxide, it might be of advantage to employ less coke, in order to increase the purifying power of the material per cubic foot.

A Million and a Half Automobiles.—Figures compiled by *Automobile* show a total of 1,548,350 automobiles, gasoline and electric, in use in the United States on July 1, an increase of about 250,000 since the first of the year. New York State leads with 140,635 cars, and Illinois comes next with 115,000. Among the States whose registration lists permit the separation of the statistics for gasoline and electric vehicles, Pennsylvania is reported to have 7,455 electric passenger cars and 2,461 electric trucks; New York, 7,000 electric cars and 2,992 trucks; Indiana, 1,000 passenger cars and 500 trucks; Massachusetts, 823 cars and 695 trucks, the District of Columbia, 710 cars and 90 trucks, and Connecticut, 400 cars and 200 trucks. In the sixteen States thus reporting separate gasoline car and electric car statistics the electric passenger cars numbered 18,055 against 508,673 gasoline machines, and the electric trucks 7,086 against 31,556 gasoline trucks.

Recent Patent Issues.

Prepared for the American Gas Light Journal by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,107,803. Process of Separating the Hydrocarbons Contained in Natural Gas. H. Koppers, Essen-on-the-Ruhr, Germany, assignor to H. Koppers Co., Chicago, Ills.

1,107,917. Suction Gas Producer. M. F. Derrick, Montreal, Quebec, Canada.

1,107,962. Gas Lighting and Extinguishing Apparatus. A. C. Kent-Johnston, Belham, London, England.

1,107,986. Apparatus for Purifying Gases. A. Muller, Leipzig Schleussig and C Bombard, Berlin, Germany.

1,108,116. Process of Impregnating the Filaments and Mantles Used in Incandescent Gas Lighting. C. Bagrachow, Paris, France.

1,108,140. Meter. M. Cornine, New York city.

1,108,207. Combined Gas Burner and Grate Bar. Charles H. and Carl H. Miller, Cleveland, O.

1,108,321. Water and Gas Controller for Water Heaters. E. T. Betker, Kansas City, Mo., assignor to Imperial Heater Co., same place.

1,108,650. Gas Cooking Stove. C. E. Willis, Southport, England.

1,108,705. Process for Extracting Ammonia and Sulphur Compounds from Gas. J. W. Cobb, Leeds, England.

1,108,960. Acetylene Gas Generator. E. T. Winter, Des Moins, Ia.

1,108,772. Thermostatic Gas Cut-Off for Water Heaters. B. E. Meacham, Lorain, O., assignor to American Stove Co., St. Louis, Mo.

1,108,773. Gas Burner. B. E. Meacham, Lorain, O., assignor to American Stove Co., St. Louis, Mo.

1,108,853. Apparatus for Scrubbing or Similarly Treating Liquids Gases. B. F. B. Sewell, Washington, D. C.

1,108,861. Automatic Burner for Gas Stoves. G. Bruton, Joliet, Ills., assignor to L. Rockey, same place.

1,109,150. Device for Lighting Gas Lamps from a Distance. L. Severin, Hagen-Delstern, Germany.

1,109,225. Gas Meter. C. W. Hinman, Boston, Mass.

1,109,272. Gas Burner. H. F. Wierum, Upper Montclair, N. J.

1,109,350. Ratchet Mechanism for Reversible Apparatus for Lighting Gas from a Distance. H. Menzel, Germany, assignor to Berlin. Anhaltische Maschinenbau-Aktien-Gesellschaft, Berlin, Germany.

1,109,537. Safety Gas Burner. H. Menten, New York City.

Items of Interest
FROM VARIOUS LOCALITIES.

The United Water, Gas & Electric Company of Hutchinson, Kas., reports increasing demands for gas. Extensions to the mains in the north end will be constructed this fall on Fifteenth, Sixteenth and Seventeenth avenues, east of Main street. This section has built up rapidly in the past few years, and the residents want gas.

The annual picnic of the employees of the Western United Gas & Electric Company at Fox River Park, Aurora, Ill., was a delightful event. Fully 600 of the employees, including wives and sweethearts, came from Joliet, Aurora, Elgin, and other places the company serves with either gas or electricity, or both. When the Joliet delegation arrived, nearly all headed straight to the ball park. The first baseball game was between the gasfitters and electricians of the Aurora plant, which closed in favor of the fitters by 14 to 7, and the gasmen got the silver loving-cup. The game between Joliet and Elgin was a little one-sided, Joliet winning 14 to 0. In the 100-yard running Joliet again showed its athletic prowess. Out of seventeen entries Joe Musich took first prize, a nice silver-plated shaving set, and George McCraken a collar-button set. These were the lean men. When the fat men came on for a test, Maurice Lowry of Aurora, carried off a sack of flour as first prize, and Ollie Eddy of Joliet, a sack of meal for being a close second—and he had a lame foot in the bargain. The ladies' running race was won by Mrs. E. Nelson, of Joliet, winning a silver pie knife. Miss McCormick of Aurora, was second. For nail driving, Miss Myra Willis of Aurora, won. When or where the mirror contest was pulled off is a mystery to the Joliet delegation, which left for home on the Louisiana at 9:30. The chicken dinner was unanimously pronounced suberb. Near its close Congressman Copley made a few felicitious remarks on the unity and loyality of the employes of the company, and heartily complimented them. He was gratified that such gatherings were in keeping with American ideals; thankful that kings nor emperors nor autocracies could interfere with any of our affairs. Referring to the many honors carried off by the Joliet contingent, he voiced the suspicion that some professionals had been carried on the pay roll, but even that would not hold good in the light of the efficiency of the force. The remainder of the evening was pleasantly spent at the dancing pavilion. The whole event was like a reunion of one big family and most heartily enjoyed by all.

The office force at the plant of the Western Gas Construction Company, in Fort Wayne, recently received a 4-pound pike caught by Mr. O. N. Guldlin, President of the Company, who is at Rome City on an outing. The force eat the fish at the home of A. W. Bruns, one of the number.

The properties of the Iowa-Nebraska Public Service Company, through foreclosure sale, have been consolidated with the Continental Gas and Electric Corporation of Cleveland, O. The Service Company owned electric light and power plants in Beatrice, Wymore, Norfolk, Tilden, Meadow Grove and Blair, Neb.; and at Missouri Valley and Logan, Ia. The merging of the two companies will make a powerful corporation which will be able to give the best service at minimum rates. Mr. Cyrus S. Eaton, President of the Continental Corporation, handled the bidding in of the properties.

Manager Alfred Montgomery of the Leominster Electric Light & Power Co., and Leominster Gas Light Co., has tendered his resignation to the directors of the Massachusetts lighting companies, of which the Leominster companies form a part, and states that it is his desires to be relieved Oct. 1. Mr. Montgomery said: "I have received no word either directly or indirectly that action has been taken on my resignation, but I shall insist on retiring by Oct. 1, so that I can sail early in October for London, England, to be near my mother, now living in that city and seriously ill."

The Cambridge (Mass.) Gas Light Company has taken the contract for lighting that city's street lamps, formerly under Welsbach service. There are about 300 lamps. Under the new contract there will be a saving of $3 per lamp each year, or a little over 10 per cent. to the city.

The output of the Boston Consolidated Gas Company for the month of August shows an increase of 4.6 per cent. as compared with the

corresponding month of last year. The July output showed an increase of 8.94 per cent.

MASTER in Chancery, John S. Lawrence, has sold the Dowagiac (Mich.) Gas Company to F. E. Lee of that city for $50,000. Mr. Lee is the principal stockholder in the P. D. Beckwith estate, owners and manufacturers of the Round Oak stoves. Mr. Lee also controls the Dowagiac Electric Company on a paying basis. About $41,000 of the purchase price will be turned over to the other creditors of the old company.

INCENSED by what they claim is an excessive rate for gas furnished to them by the Nassau and Suffolk Lighting Company, some of the citizens of Freeport, N. Y., have appealed to the Village Fathers and especially to Village President Roland M. Lamb, in an effort to secure relief. So many complaints have come to the attention of the President that he has decided to take action. At the next meeting of the Village Board he will request the appointment of a Citizens' Economy Committee to confer with the gas company as to the immediate possibilities of supplying gas to residents of Freeport at a more reasonable rate. If no reduction can be secured, Mr. Lamb, it is reported, will advise the committee to investigate the cost of a municipal plant to be run in connection with the present electrical plant, and to submit such a proposition to the taxpayers at the next election.

WORK on the gas plant at North Platte, Neb., is progressing rapidly, and the first cars of pipe for mains have arrived. Thus plant and distribution system will be pushed together.

DEFINITE action on the part of the city in preparation for the expiration of the franchise now held by the Kalamazoo (Mich.) City Gas Company has been announced by Chairman Early of the Engineering Committee. The members will gather to discuss plans for an expert survey of the gas problems of the city, under the direction of a special engineer engaged for that purpose. City Attorney Schaberg, on behalf of the Committee, has been in correspondence with a number of experts in various parts of the country, and the Aldermen will meet to consider the plans as far as they have progressed at the present. The Municipal Ownership League is already actively engaged in the campaign and petitions are being circulated, asking that the Council submit city ownership of the gas interests to the people at the next election. The officials of the league are also preparing to take a hand in the selection of an engineer and are in communication with several experts in England who have charge of large municipal gas interests in that country.

MR. NATHANIEL W. GIFFORD, General Manager of the East Boston (Mass.) Gas Company, did not have much trouble in getting back home, mainly because he took time by the forelock and left Paris July 30, having stayed there only 2 days. He sailed for Europe about the 1st of June with his wife and daughters, and intended to remain 2 months. Anticipating financial difficulties, he cashed a large part of the American Express money orders he carried before the stringency became very marked, so that at no time was he without sufficient funds. "The eastern station in Paris was useless for travellers," said Mr. Gifford, "but the northern station was performing its work creditably. I had no trouble in getting to Brussels, which I reached August 3. I lost no baggage, although some of my frinds did while in Paris. War had been declared on England when we left Brussels, and the trains were packed with soldiers as well as civilians. We heard reports of robberies of tourists, but we suffered no loss."

THE El Paso (Tex.) Gas Company has been busy during the past year increasing, enlarging and improving its plant and perfecting its service. At the plant the Company has spent $60,000 in rebuilding to increase the output and improve the service. New buildings, larger purifiers, condensers and tanks have been added until the plant now has a capacity of 1,000,000 feet a day. Governors have been placed in the outlying districts to reduce the pressure and improve the service in those suburban sections. This improvement cost $3,500 and is only one of many similar improvements. Extensions have been made in the gas mains at the rate of $2,000 worth of work each month during the past 12. The Grand View extension cost $17,000 and included the laying of 48,000 feet of pipe in Grand View and Manhattan Heights additions. The Government Hill extension measures 6,000 feet and has given service to an increased district in that suburb. A trunk line main through the center of the city to cost $35,000, by which the city's supply of gas will be carried through the business district in 20-inch, 16 and 12-inch pipes, is among the new work planned for the next year.

MEASURED by the increase in consumers of gas in Houston, Tex., during the past 10 years, the city's growth has been a thing of leaps and bounds. The books of the Houston Gas and Fuel Company show that in 1903 the entire service included only 30 miles of mains, while at the close of 1913 there were a total of 167 miles of mains, an increase of 456 per cent. Since the first of the year a pproximately 25 additional miles have been laid, and arrangements have been made with the company for furnishing gas for a large suburban gas system controlled by another company. The total number of service connections in 1903 were 1,661, while at the close of 1913 there were 10,211 or an increase of 514 per cent. Both the number of connections and the number of meters in service have been increased measurably since the beginning of this year. Improvements and extensions are still going on at a rate that makes it impracticable to give figures, but it is predicted by the company that the growth this year will be equal to that of any recent year. From a capacity of 1,000,000 cubic feet in 1903, the plant has been increased to a manufacturing capacity of 5,000,000 cubic feet, an increase of 400 per cent. within the decade. Large expenditures are being made by the company at present in keeping ahead of the work being done by the city in the way of paving additional streets.

MR. J. J. POTTS, of Waco, Tex., has applied for a franchise to pipe natural gas through the streets of Waco. Mr. Potts asked a 50-cent rate for gas for domestic purposes and 20 to 12 cents for factory consumption according to quantity used. The domestic rate asked is the same as that under which the Baker franchise was granted. Mr. Potts agreed to put up a $5,000 cash bond guaranteeing to start work of construction on the pipe line within 10 days after franchise is granted. W. W. Seley appeared before the commission and said that his company expects to pipe gas to the city limits of Waco, and hoped to arrange to sell the product to the Texas Power and Light Company, said company to distribute same through its mains to the consumers of Waco.

THE work of fixing the physical valuation of the Union Gas and Electric Company, of Cincinnati, O., will be completed by the State Public Utilities Commission about January 1, according to E. W. Doty and Charles Marshall, Utilities Commissioners, in Cincinnati on an inspection trip.

MR. C. W. SEARS, manager of the Fort Worth (Tex.) Gas Company, has resigned his position to become special agent of the Southern California Gas Company, with headquarters at Los Angeles. O. K. Shannon, at present Secretary of the Company, will succeed Mr. Sears. The change became effective Sept. 1.

MR. H. P. DAINS has joined the forces of the Roberts & Mander Stove Company, and will represent the "Quality" line in New England territory, beginning the 1st instant.

MR. PAUL DOTY is receiving congr atulations on the arrival of a little daughter, which has been named Diana. The name is Mr. Doty's happy solution of the problem of combining the names of the little lady's two grandmothers, Anna and Ann.

"THE price of gas will simply have to be raised to meet this ridiculous increase in our assessment," declared C. H. Geist, President of the Atlantic City (N. J.) Gas Company, in discussing the announcement of the County Board of Taxation, raising the gas company's assessment from $106,500 to $1,785,900, an increase of over $1.500.000. It is understood that in arriving at their new figures, the Tax Board took the report which the corporations had made to the Public Utilities Commission, and deducted about 50 per cent. of the valuations which they swore to in their statements. "The public utilities of Atlantic County have been escaping their just taxation for years," declared one member of the Tax Board. "It is unfair and an imposition on the general public. Moreover, they cannot raise the price of their commodities without showing the State Public Utilities Commission sufficient reason." That the corporations will not tamely submit to such a raise in their assessments was clearly demonstrated in the words of Mr. Geist. "If this assessment stands, the price of gas will go up. We will take the matter to the Public Utility Commission and ask to be allowed to make the raise, for the gas company could not stand the burden of paying taxes on such a ridiculous assessment and still furnish gas at the 90 cent rate."

Utilities Commission News.

NOT GUARANTEED RETURN.—The city solicitor of Bucyrus, O., has filed a brief with the commission in the rate case of the Bucyrus Light, Heat and Power Company. He asserts that a public service corporation is not entitled to a fixed or definite return on its investment. The interests of the consumers are to be considered first, he argues, and a utility company has not the right to plead to the commission that it is entitled to any certain return until the rates are actually reduced. He alse argues that in fixing the rate the commission should take into consideration the probable increase in business which the reduced rate would naturally bring to the company. If depreciation is greater than it should have been because of the selection of poor apparatus, he argues that the bill should not be paid by the people through the maintenance of high rates. The commission, he says, should investigate the company's business in order to determine the earnings after the ordinance goes into effect.

HOW MONEY WAS SPENT.—The Consolidated, Gas, Electric Light and Power Company has filed with the Maryland Public Service Commission a final report on its expenditure of the proceeds of the sale of $1,500,000 stock authorized last year. The report shows the expenditures for betterments in detail, aggregating $765,000, while $700,000 went for the redemption of an outstanding loan.

VALUE OF INDIANA PLANTS.—The Indiana Public Service Commission has issued its report of the work of field agents who were in New Albany July 1 to August 24 making an estimate of the physical valuation of property of the United Gas and Electric Company of New Albany. The report places the probable cost of reproduction at $246,906. and the present value at $188,764. On account of the difference in the cost of the service of public utilities in different cities, the commission is making an effort to standardize the rates. Water rates are from 6 to 60 cents a 1,000 gallons, electric energy from 5 to 15 cents a killowatt hour, and gas rates from 55 cents to $1.50 per 1,000 cubic feet. It is having an estimate made of the physical valuation of the various public utilities companies in the State, upon which the rates for service to consumers will be based. Companies also are having valuations made by experts, and evidence from these will be heard.

MUST SUPPLY EVERYONE.—On the ground that the company enjoyed an exclusive franchise and that it is incumbent on it to furnish gas in all portions of the city of Seattle without an excessive charge, the Seattle Lighting Company was ordered by the Public Service Commission of Washington to extend its mains in West Seattle so as to reach the complainant in a case. The company originally protested against making the extension, declaring it would cost more than the derived revenue would warrant. It refused to serve the complainant in the case unless he paid $25 toward the cost of extending the gas main. An appeal to the Commission was the result.

EVANSTON, ILLS., COMPLAINT.—The city officials of Evanston, Ills., have complained to the commission that the prices for gas and electricity charged in that city by the Public Service Company, of Northern Illinois. are too high. The commission has ordered the company to submit an invoice and valuation by Sept. 15. Action on the complaint will be taken about the middle of October.

MISSOURI RULES.—The order of the public utility commission establishing standards of rates and service for all gas, electric and water utilities operating in this State did not become effective August 1 as was originally contemplated and will probably not become effective until after another hearing. The protest against the order came at the hearing July 29, from municipally owned electric, gas and water plants. The order may be changed so as not to include municipal plants. Representatives from St. Louis stated at the hearing that if the municipal water plant was not exempted from the ruling it would be necessary to raise rates. They objected most strenuously to that section of the order which would require them to buy up all the meters now owned by the people and which would require them to own the connection between the water main and the curb. It would cost the city of St. Louis over $2,000,000 to comply with the order, and would require a bond election. The rates in St. Louis now are approximately 7½ cents a thousand gallons.

Financial Notes.

THE Executive Committee of the San Francisco Stock and Bond Exchange rules that there can be no more transactions in Pacific Gas preferred below 80, the previous minimum having been fixed at 79, the common at 37½. Its report for July gives total gross earnings from all departments amounting to $1,350,322, $140,730 greater than in 1913. Operating expenses decreased $72,004 to $737,138, leaving net revenue of $613,184, a gain of $212,734, and the surplus after bond interest and discount increased $205,114 to $276,611. For the 12 months ended July 31 gross earnings from all sources were $16,833, 780, an increase of $1,371,404 over the previous year, operating charges decreased $39,390 and net earnings increased $1,410,784 to $7,815,101, while surplus was $3,817,510, a gain of $1,283,656, or nearly 51 per cent.

THE United Gas Improvement Company has declared the usual quarterly dividend of 2 per cent., payable October 15, to holders of record on September 30.

THE consolidated earnings of five companies of the American Gas and Electric show for the 12 months ended July 31, 1914, gross of $2,844,445, a gain of $424,779, over the preceding 12 months, with net of $1,533,465, an increase of $246,429 and surplus after charges of $960,613, a gain of $152,538. The average percentage of gross earnings saved for net by the five companies was 53.91 per cent., compared to 53.19 per cent. the preceding year. Interest charges were slightly higher in proportion to net for the year ended July 31, 1914, than for the preceding year. In the 12 months just ended, 62.64 per cent. of net earnings were carried to surplus, against 62.78 per cent. for the 12 months ended July 31, 1913.

THROUGH the Continental and Commersial National and the National City Banks of Chicago the Continental Gas and Electric Corporation has purchased the Nebraska Gas and Electric and the Iowa Gas and Electric Companies, both of which were organized recently and acquired the properties of the Iowa and Nebraska Public Service Company, which failed about a year ago. The financial arrangements, which are quite an unusual thing under present conditions, were made by President Cyrus S. Eaton of the purchasing company a few days ago. The transaction involves an exchange of $500,000 bonds of the companies acquired for bonds of the Continental Gas Company and the sale of $150,000 additional bonds for improvements to the properties taken over. The bank syndicate will take the bonds and something more than $1,000,000 securities besides, which will be held for sale in a more favorable market later. The companies purchased by the Continental Gas Company supply 12 towns and cities in Iowa and Nebraska with gas and electric service, which makes a total of 45 towns and cities now supplied by the purchasing corporation.

STOCKHOLDERS of the Ohio Cities Gas Company have received dividend checks covering the regular quarterly payment of 1¼ per cent. on the common stock of record Aug. 15. Enclosed with the dividend checks was a copy of the company's balance sheet as of July 31, 1914. This reveals a position of extraordinary financial strength and assures the continued payment of the dividends of this company. It is stated that the earnings of the company are maintaining a level that more than justifies the present rate of dividend disbursement. The shares of this company are among the few in this market that have evidenced no bad effects from the European war influences, but continue to show both strong financial position and earning rate. Officers of the company express confidence in the future of the properties.

THE Columbus Gas and Fuel Company has declared the usual quarterly dividend of 1¼ per cent. on its preferred stock, payable Oct. 1, to stock of record Sept. 15.

THE Kansas Gas and Electric Company, an American Power and Light Company subsidiary, reports for July gross earnings of $76,252, an increase of $8,262, or 12 per cent. Expenses and taxes were 17 per cent. larger, and net earnings were $25,980, a gain of $824. Income after charges was $11,227 or $525 more than for July, 1913. For the 12 months ended July 31, 1914, gross earnings aggregated $1,112,605, an expansion of $149,523, or 16 per cent. Expenses and taxes were 13 per cent. heavier and net earnings were $402,249, an increase of $66,835, or 20 per cent. After interest charges and preferred dividends there was a balance of $119,343, as compared with $61,217, a gain of 95 per cent. compared with the preceding year.